December 7, 1929 A McGraw-Hill Publication 20 Cents per Copy

AVIATION

The Oldest American Aeronautical Magazine

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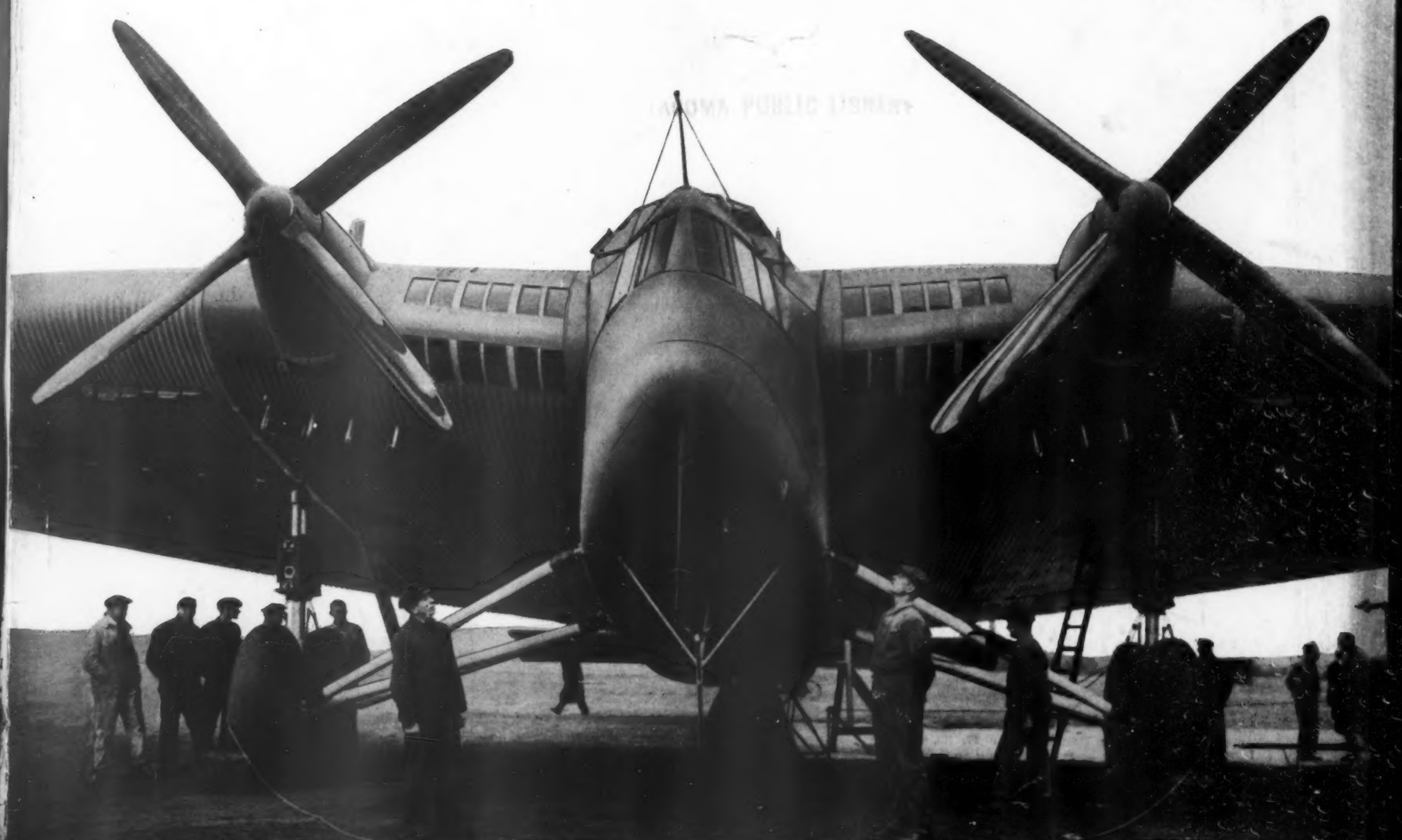
CERTIFIED TRAILS AND *Safety Ratings*

Airport Lighting METHODS

WHAT PRICE *Mergers?*



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TWO RECORD PERFORMANCES

Blaze a New Name Across the Nation's Highways

INLAND SPORT MONOPLANE

IN a fully loaded stock model Inland taken off the production line, Lieutenant Willfred G. Moore recently made a new world's speed record for Light Airplanes of the First Category. The plane was the same he had previously flown in establishing a new American Record for altitude.

Moore's plane is a stock model Inland. It was *not* especially designed or built for these trials. It is exactly the kind of ship you would get if you bought an Inland tomorrow. Weighing 850 pounds empty, on the occasion of these trials it carried a load of 330½ pounds, including pilot.

123.17 Miles an Hour

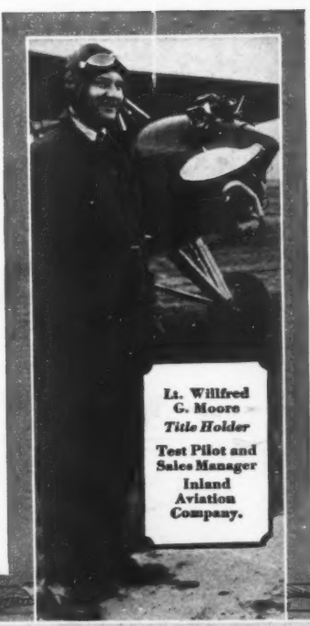
World's Record for Light Planes

On November 4 Lieutenant Moore flew his Inland Sport Monoplane with a Warner Scarab engine over a 100-kilometer closed course in 30 minutes, 12 4-5 seconds . . . at a speed of 123.17 miles an hour. This is 3.31 miles an hour faster than the former record, established in December, 1928, by A. S. Butler, an English flier.

19,659 Feet Altitude

American Record for Light Planes

Previously on October 25, Lieutenant Moore had set a new American light plane record for altitude, by flying the same Inland Sport Monoplane to a height of 19,659 feet. This is only 200 feet from the world's record.



Lt. Willfred G. Moore
Title Holder
Test Pilot and Sales Manager Inland Aviation Company.

THESE two records are official evidence that the Inland has performance far better than the average light airplane.

Inland Sport Monoplanes are manufactured in a fine new factory at Fairfax Airport under Approved Type Certificate No. 259. The Inland is a high wing two-seater monoplane with side-by-side seating arrangement. It is powered with a LeBlond 60 or Warner Scarab engine.

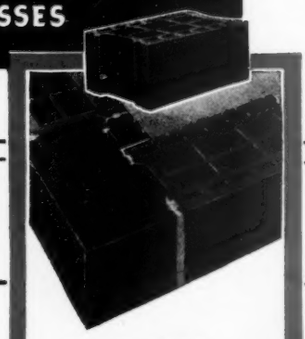
Well financed and well-equipped distributors who need a small, low price sport plane to complete their line will do well to investigate the Inland proposition. For refinement of design, beauty of line and color, and for performance and reliability, the INLAND SPORT has few equals.

INLAND AVIATION COMPANY
Kansas City, Missouri

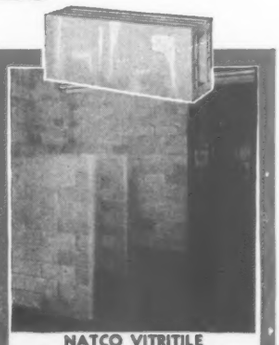
7 ESSENTIALS IN ALL MET WITH

✓ FIRE SAFETY
✓ ECONOMY
✓ SPEEDY CONSTRUCTION
✓ PERMANENCE
✓ LOW MAINTENANCE
✓ LOW DEPRECIATION
✓ DECREASED HEAT LOSSES

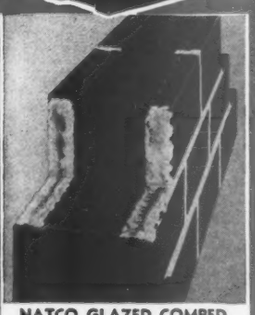
A few minutes work with your pencil can save you much grief and many dollars . . . Just note down every essential that an ideal airport building material should have—then check them against the things that Natco Structural Clay Tile will give you. Natco, from one source of supply, fills every need, meets every requirement, eliminates guesswork and regrets. Its years of service in outstanding buildings all over the country is a guarantee to you of complete satisfaction.



NATCO TEX-TILE
For exterior walls. Beautiful textured face. Inside scored for plaster.



NATCO VITRITILE
For interior and exterior walls of permanent beauty—a sanitary, glazed tile of striking attractiveness; economical, wide possibilities.



NATCO GLAZED COMBED FACE
For exterior walls. Smooth sanitary, easily cleaned interior wall—no plastering or painting.

NATCO UNDERGROUND CLAY CONDUIT
Put overhead light and power wires underground in Natco Underground Clay Conduit. Gives permanent and complete protection to cables.

CRAFT IS NEAR DISASTER AS IT STARTS FLIGHT

Eckener's Masterly Handling Prevents Ship From Hitting Wires.

BETTI DIES HITS

Akron Pilot, Lost in Fog, Crashes Into Wires; Ship Ablaze Shoots Along Road

Pilot Harry Smith, 26, of Akron, O., was killed when the [illegible] plane he was flying [illegible]

NATCO
THE *COMPLETE* LINE *of* STRUCTURAL CLAY TILE

NATIONAL

AIRPORT CONSTRUCTION
ONE BUILDING MATERIAL

FIRE SAFETY
Natco Structural Clay Tile are molded from special clay and burned in great kilns, at a temperature of over 2000 degrees, to the density and strength of rock. Absolutely non-inflammable, they help confine a fire and afterwards permit a maximum of salvage.

ECONOMY
The large, easily handled units are laid at sizable savings in time, labor, mortar, and expense. First cost is low, upkeep is small.

SPEEDY CONSTRUCTION
The various types of Natco Tile provide a size and style for every building need. Each tile is equivalent in volume to several brick. Natco airport structures go up with gratifying speed, are quickly ready for use.

PERMANENCE
Natco Tile are unaffected by heat and cold, dampness, chemicals, and weathering. They are permanent in character and form; never rust, rot, warp, or disintegrate. Airport buildings constructed of Natco are up to stay.

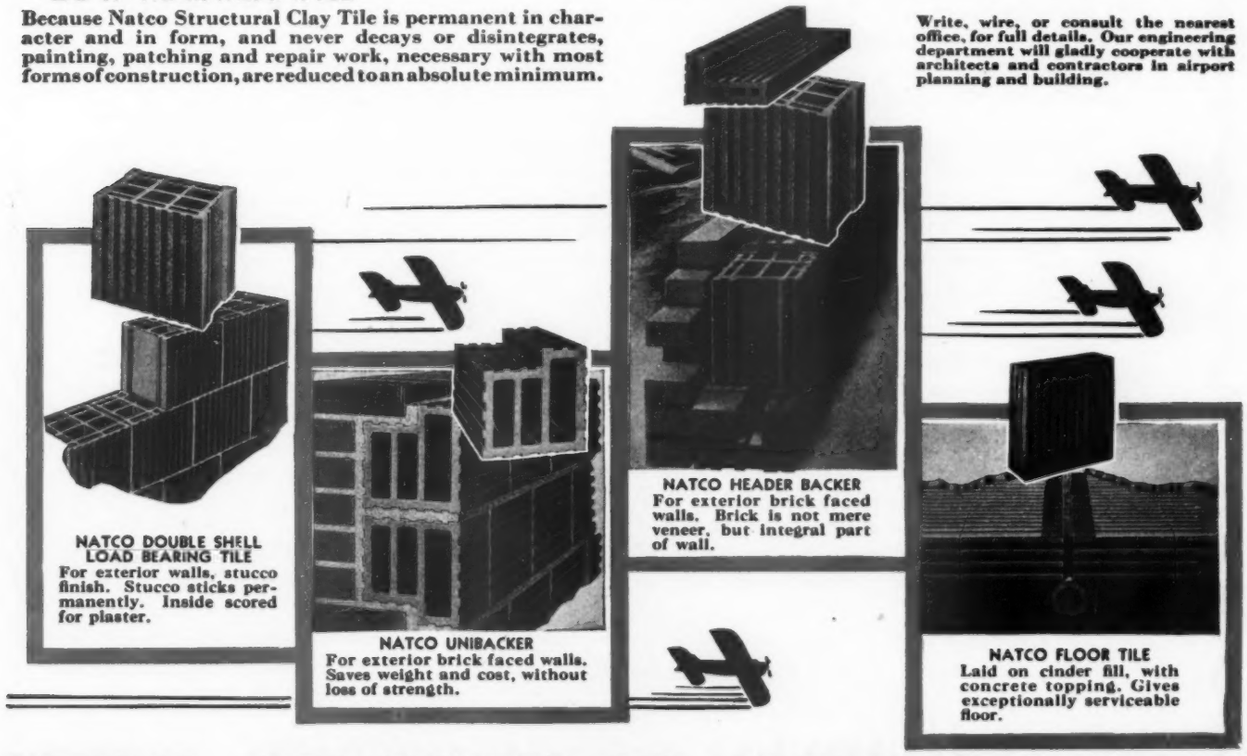
LOW MAINTENANCE
Because Natco Structural Clay Tile is permanent in character and in form, and never decays or disintegrates, painting, patching and repair work, necessary with most forms of construction, are reduced to an absolute minimum.

NATCO
THE *COMPLETE* LINE *of*
STRUCTURAL CLAY TILE

LOW DEPRECIATION
Natco Structural Clay Tile may be truly called "Blood Brother to the Everlasting Rocks." Buildings built of it are highly resistive to all the agencies of destruction and decay. Depreciation is usually figured at ½% a year.

DECREASED HEAT LOSS
All Natco Structural Clay Tile have dead air spaces, which confer high insulating value. The passage of heat and cold is retarded to a great degree. This feature is tremendously important in all buildings, and especially so in hangars.

Write, wire, or consult the nearest office, for full details. Our engineering department will gladly cooperate with architects and contractors in airport planning and building.



NATCO DOUBLE SHELL LOAD BEARING TILE
For exterior walls, stucco finish. Stucco sticks permanently. Inside scored for plaster.

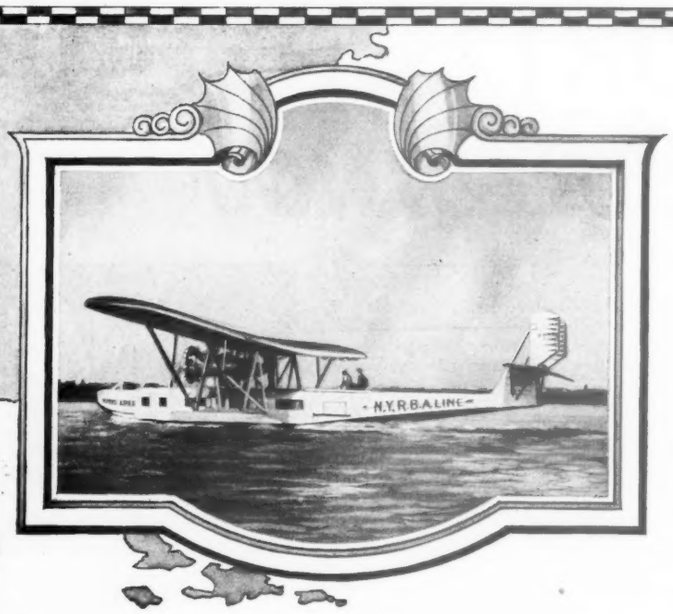
NATCO UNIBACKER
For exterior brick faced walls. Saves weight and cost, without loss of strength.

NATCO HEADER BACKER
For exterior brick faced walls. Brick is not mere veneer, but integral part of wall.

NATCO FLOOR TILE
Laid on cinder fill, with concrete topping. Gives exceptionally serviceable floor.

FIRE·PROOFING·COMPANY

General Offices: **Fulton Building, Pittsburgh, Pa.**
Branch Offices: **New York, Chanin Bldg.; Chicago, Builders Bldg.; Philadelphia, Land Title Bldg.; Boston, Textile Bldg.**
In Canada: **National Fire Proofing Company of Canada, Ltd., Toronto, Ontario**



The COMMODORE
"The pride of the sky"

IF any evidence were needed that aviation had changed from a hazardous adventure to a world industry of vast importance it is furnished by the Consolidated Commodore.

These giant sea-going air liners, with a wing spread of 100 feet, and a carrying capacity of 25 passengers and thousands of pounds of air mail, operate safely and regularly along an 8000 mile route—spanning the distance between New York City and Buenos Aires in seven days.

Designers of planes capable of accomplishing such vast transportation enterprises now turn unerringly to Aluminum and its alloys, as the one material that will serve their purpose.

The Consolidated Commodore is a notable example. Practically the entire ship is fabricated from strong heat treated Aluminum Alloy, surfaced on exposed parts with pure Aluminum —a protection against corrosion known as the ALCLAD process.

Even the Commodore's twin 'Wasps' depend upon strong Aluminum Alloys to eliminate dead, useless weight—and all sluggishness and inertia from moving parts. Crank case, accessory drive housing, pistons, cylinder heads, diffuser section and nose and rear sections of these reliable Pratt & Whitney engines are made of strong, heat-treated Aluminum alloys.

* * *

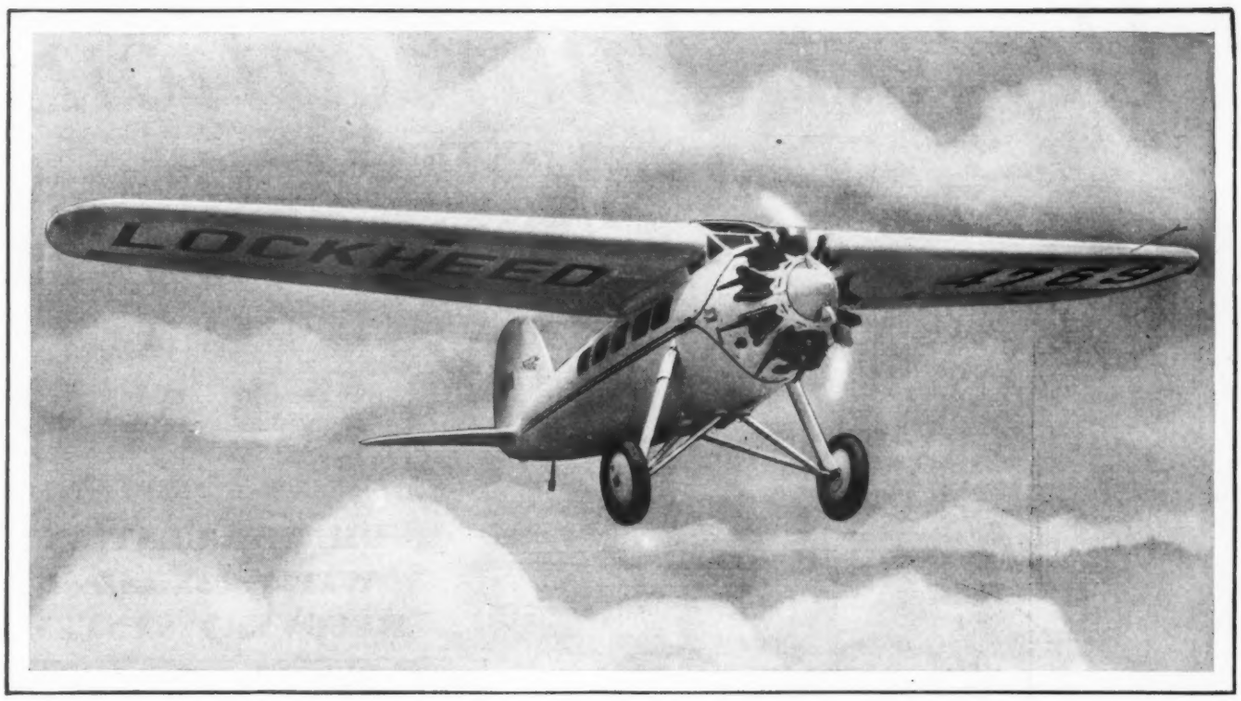
The technical staff of Aluminum Company of America, creators of strong Aluminum Alloys and ALCLAD products invite contacts with designers and builders on all phases of the application of Aluminum to aircraft.

ALUMINUM COMPANY OF AMERICA
2480 Oliver Bldg., Pittsburgh, Pa.
Offices in 19 Principal American Cities

ALCOA

ALUMINUM AND ITS ALLOYS FOR AIRCRAFT

ALCOA



THE NEW 7-PLACE LOCKHEED VEGA

World's fastest commercial plane . . with lowest cost per passenger mile

For commercial purposes, the new Lockheed Vega offers airline owners a 7-place ship that is unquestionably the fastest and the most economical transport plane to operate. With a speed of 165 m. p. h. it cuts passenger-mile costs to the lowest—and earns a premium for passengers in time saved.

With Department of Commerce Approved Type Certificate Number 227, the new 7-place Lockheed Vega is licensed to carry 6 passengers or a useful load of 1775 pounds. Powered by the ever-reliable Wasp engine it is the most logical plane for fast commercial transportation.

The new 7-place Lockheed Vega is listed at $18,900.
Complete information will gladly be sent upon request.

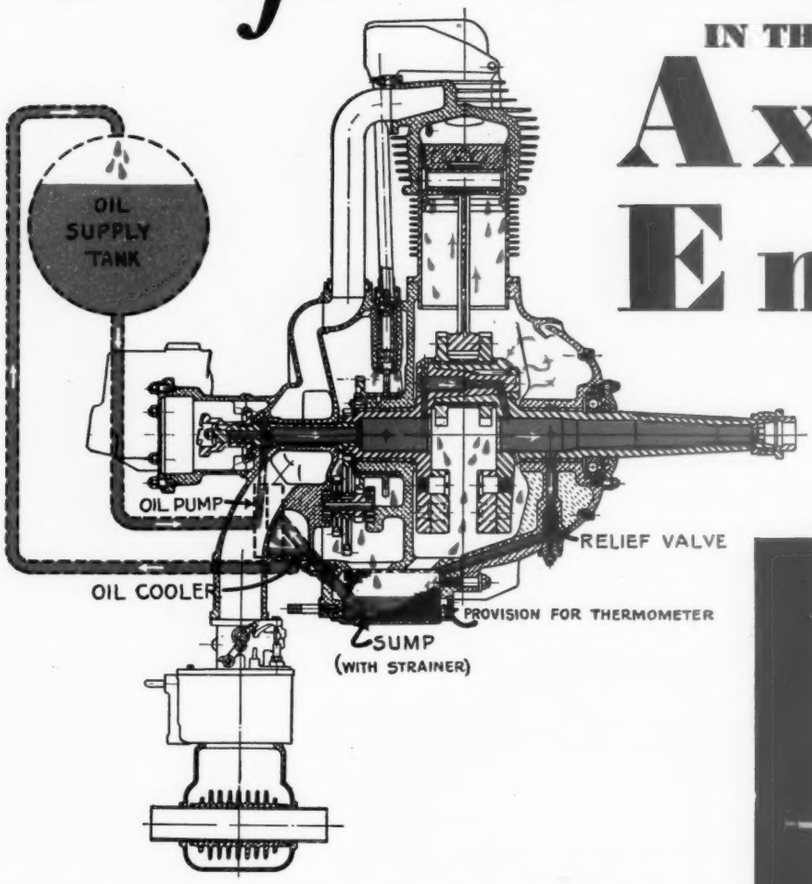
LOCKHEED
VEGA

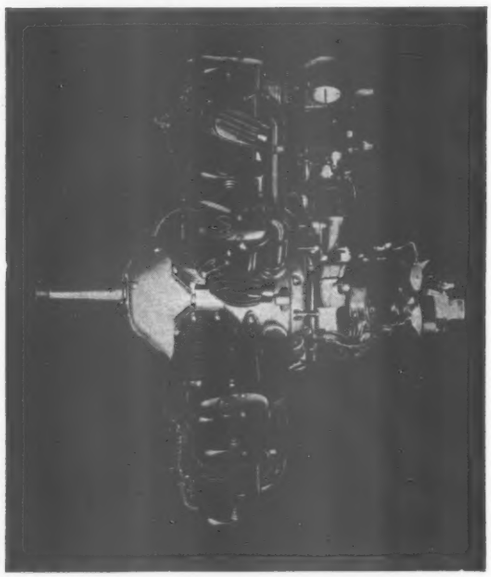
LOCKHEED AIRCRAFT CORPORATION . . . . . Burbank, California
DIVISION OF
DETROIT AIRCRAFT CORPORATION . . . . . Union Trust Building, Detroit

Perfect Lubrication

IN THE Axelson Engine

Positive OIL CIRCULATION WITH *economical* RECOVERY SYSTEM





The lubricating oil passes from the supply tank through the pressure pump, on the rear of the engine, entering the hollow crankshaft. The passages for the oil are integral with the crankcase. The oil leaves the crankshaft at the front main bearing, passing through the pressure relief valve, which is built into the front crankcase section. From the relief valve, the oil enters the oil sump, where it is passed through a double mesh oil screen. It then leaves the oil sump via a short external line of ample diameter —the only external line of the entire system—passing through the scavenging pump into the oil cooler. The temperature of the oil is there modified to the best operating point, the excess heat being transmitted to the intake mixture. The scavenging pump adjoins the oil cooler and is connected directly thereto without any piping. The cycle is completed by a connection from the oil cooler back to the supply tank. In addition to the front oil breather, there are two breathers located in the central crankcase section, thus assuring proper crankcase ventilation. Provision is made in the oil sump for inserting a thermometer.

This positive system of lubrication of the main bearings is based on the most approved principle and assures uniform distribution of the oil at all times.

Axelson Aircraft Engine Co.
Factory and General Offices:
Corner Randolph St. and Boyle Avenue
Los Angeles, California
(P. O. Box 337)

AXELSON AIRPLANE ENGINES

Seattle, Washington.

August 30th, 1929.

Mr. George I. Gluck, President,
Aero Supply Manufacturing Company, Inc.,
College Point,
LONG ISLAND, N.Y.

Dear Sir:

Boeing Air Transport has fixed October as the date for the inauguration of the flights of the first 18-passenger tri-motored service between San Francisco and Chicago.

The transport is manufactured by the Boeing Airplane Company, which uses Aero bolts, nuts and washers in the construction of this plane. The transport has a wing span of 80 feet, length over all of 55 feet, and a weight of 8½ tons when fully loaded and in the air, and represents America's most advanced airplane construction.

In the building of these huge planes the Boeing Company spared no expense and quality was the first requirement in choosing materials.

fact that the Boeing Airplane Company, in the building of these great transports, selected your product, a real endorsement I am sure.

So that you may have the facts about this service I am enclosing a statement giving details of the plane construction, and the new service. I am also sending you a picture properly captioned. Should you desire additional pictures we will be glad to hear from you.

Yours very truly,
Harold Crary
Harold Crary,
Manager of Publicity & Advertising,
Boeing Companies.

"In the building of these huge planes the Boeing Company spared no expense, and quality was the first requirement in choosing materials".

". . . . . that the Boeing Company in the building of these great transports selected your products"

. . . Through years of experience—Boeing has found that Aero Supply products have met their own high standards of excellence. That's why Aero Supply was called upon to furnish the hundreds of small "hardware" parts, such as bolts, nuts, washers, shackles, clevises and many other items, used in the structure of its latest model . . . the new 18-passenger Boeing Transport.

OUR CREED
MAKE IT SAFE FOR THE FLYERS
THE WORLD OVER

AERO SUPPLY MFG. CO., INC.

COLLEGE POINT LONG ISLAND, N. Y.

SUBSIDIARIES

NATIONAL STEEL PRODUCTS CO., DAYTON, O.
STANDARD AUTOMATIC PRODUCTS CORP., CORRY, PA.

OUR CREED
MAKE IT SAFE FOR THE FLYERS
THE WORLD OVER

MOTH

Service Stations Cover the World

WITH a Moth, the whole world is your care-free playground! You can fly from coast to coast—summer in Canada, winter in the south—you can even fold your trusty Moth's wings, pack it on a steamer, and sail for colorful lands abroad, where new flying thrills await you. And wherever you fly your Moth, you will always have the assurance that comes from being within easy reach of a station where your plane and engine can be expertly serviced. On the opposite page, we give a list of such stations. No other plane can offer such complete service facilities. A Moth owner buys—a Moth dealer sells—not only a plane of exceptional performance, but also unlimited flying possibilities!

We are glad to announce that due to greatly increased production, we are able to make immediate deliveries of Gipsy Moth planes.

LICENSEE: THE DE HAVILLAND AIRCRAFT CO., LTD.

This World-Wide Organization is at the service of

GIPSY MOTH Owners

Gipsy Moth Distributors and Dealers

We list below cities in which Moth demonstrations and service may be obtained.

Curtiss Flying Service Branches

Boston, Mass.
Bridgeport, Conn.
Springfield, Mass.
Hartford, Conn.
Manchester, N. H.
Martha's Vineyard, Mass.
Providence, R. I.
Portland, Me.
Rockland, Me.
Worcester, Mass.
New York, N. Y.
Roosevelt Field, L. I.
Valley Stream, L. I.
Baltimore, Md.
Philadelphia, Pa.
Washington, D. C.
Pittsburgh, Pa.
Syracuse, N. Y.
Buffalo, N. Y.
Cleveland, O.
Detroit, Mich.
Moline, Ill.
St. Louis, Mo.
Chicago, Ill.
Columbus, O.
Kansas City, Kan.
Houston, Texas
Indianapolis, Ind.
Oklahoma City, Okla.
Louisville, Ky.
Memphis, Tenn.
Nashville, Tenn.
Raleigh, N. C.
Miami, Fla.
Palm Beach, Fla.
Toledo, O.
San Francisco, Cal.
Los Angeles, Cal.

Distributors and Flying Clubs in Canada and the Provinces

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Montreal, Que.
Winnipeg, Man.
Calgary, Alta.
Vancouver
Halifax, N. S.
St. John, N. B.
Moncton, N. B.
Granby, Que.
Kingston, Ont.
Ottowa, Ont.
Hamilton, Ont.
St. Catherines, Ont.
London, Ont.
Walkerville, Ont.
Fort William, Ont.
Regina, Sask.
Moose Jaw, Sask.
Saskatoon, Sask.
Edmonton, Alta.

Skyways, Inc., Boston, Mass.
Skyways, Inc., West Barnstable, Mass.
Skyways, Inc., Portland, Me.
Albany Air Service, Albany, N. Y.
Harris & Brown, Wellsville, N. Y.
Mobodo Aircraft Corporation, Plattsburgh, N. Y.
Utica Flying Service, Utica, N. Y.
Air Service, Inc., Johnstown, Pa.
Lancaster Airways, Lancaster, Pa.
Thompson Aeronautical Corp., Cleveland, O.
Thompson Aeronautical Corp.,Detroit, Mich.
Thompson Aeronautical Corp., Kalamazoo, Mich.
Dixie Flying Service, Charlottesville, Va.
H. S. Jones, Fort Worth, Texas
Crook Company, Los Angeles, Cal.
Phil Davis, Oakland, Cal.

Wright Aeronautical Corporation Parts Distributors

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Dearborn, Mich.
St. Louis, Mo.
Kansas City, Mo.
Los Angeles, Cal.
Atlanta, Ga.
Fort Worth, Texas
Mexico City

Wright Aeronautical Corporation Approved Service Stations

Revere, Mass.
Concord, N. H.
New York, N. Y.
Albany, N. Y.
Syracuse, N. Y.
Buffalo, N. Y.
Pittsburgh, Pa.
Evansville, Ind.
Indianapolis, Ind.
Terre Haute, Ind.
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Cincinnati, O.
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Jackson, Mich.
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St. Louis, Mo.
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Santa Maria, Cal.
Van Nuys, Cal.
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Spartanburg, S. C.
Nashville, Tenn.
Chattanooga, Tenn.
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Miami, Fla.
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Jacksonville, Fla.
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Oklahoma City, Okla.
New Orleans, La.
Monroe, La.
Shreveport, La.
Dallas, Texas
Houston, Texas
Brownsville, Texas
El Paso, Texas
San Antonio, Texas
Amarillo, Texas
Big Springs, Texas

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Newcastle
Birmingham
Bristol
Glasgow
Hamble (Hampshire)
Folkestone
Northampton
Leicester
Norwich
Hadleigh (Suffolk)
Bournemouth
Nottingham
Heston (Middlesex)
Hanworth (Middlesex)
Brooklands (Surrey)
Haldon (Devonshire)
Cambridge (Bristol)
Teignmouth

Distributors, Flying Clubs and Schools Abroad

Melbourne, Australia
Adelaide, Australia
Brisbane, Australia
Hay, W. Australia
Perth, Australia
Longreach, Australia
Sidney, Australia
Goulburn, New South Wales
Auckland, New Zealand
Karachi, India
Delhi, India
Bombay, India
Calcutta, India
Allahabad, India
Johannesburg, South Africa
Durban, South Africa
East London, South Africa
Port Elizabeth, South Africa
Germiston, South Africa
Mozambique, Portuguese East Africa
Berlin, Germany
Bologna, Italy
Brussels, Belgium
Oslo, Norway
Stockholm, Sweden
Madrid, Spain
Kobenhavn, Denmark
Basle, Switzerland
Geneva, Switzerland
Athens, Greece
Constantinople, Turkey
Tallinn, Esthonia
Zbaszyn, Poland
Belgrade, Jugo-Slavia
Singapore, Straits Settlements
Malta
Shanghai, China
Mexico City, Mexico
Valparaiso, Chile
Santiago-de-Chile
Lima, Peru

MOTH AIRCRAFT CORPORATION, LOWELL, MASS.

COMPANION PLANE TO THE VIKING FLYING BOAT

THE KITTYHAWK

First and foremost built for safe flying

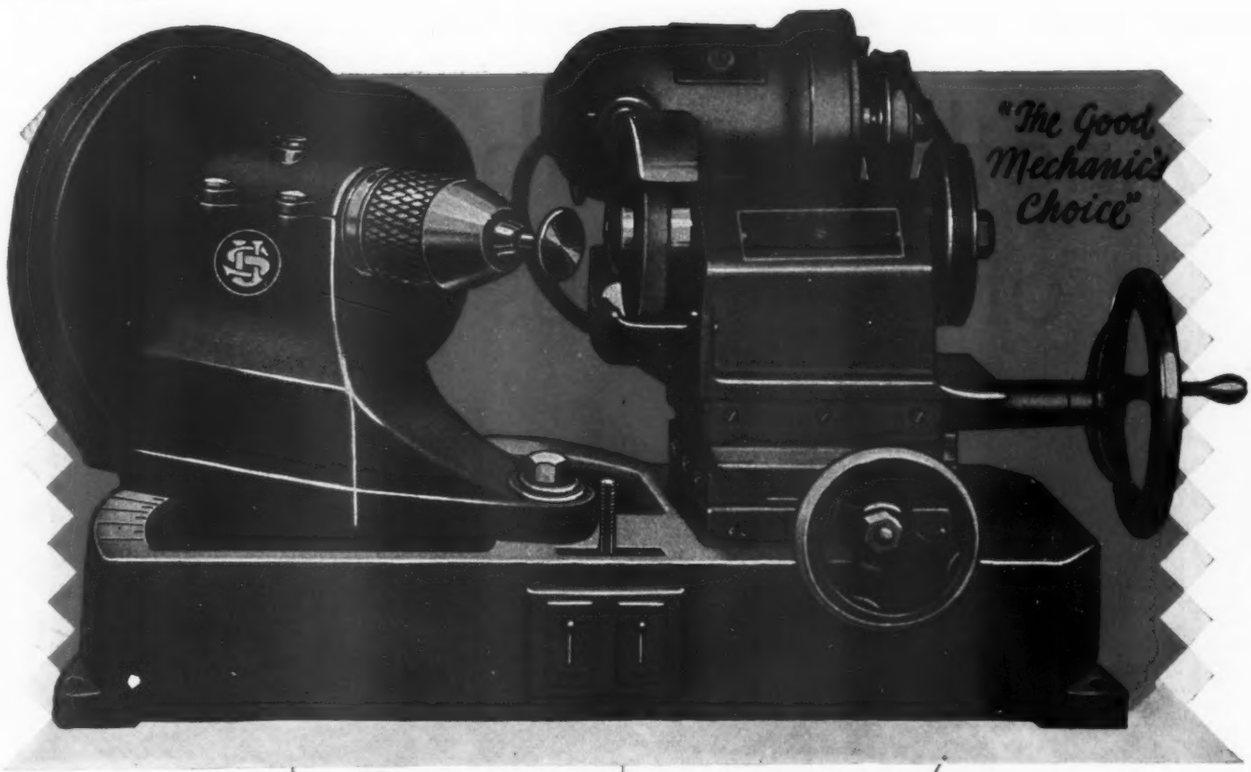
To gain superiority in either speed or performance a plane must sacrifice safe flying qualities. The Kittyhawk has not attempted to develop those features at the expense of its general all-round characteristics for safe flying . . . it will travel at 110 miles per hour . . . it will out-perform most planes in its class . . . but first and foremost the Kittyhawk is built for safe flying.

With a landing speed of 38 miles per hour . . . with a wheel tread of seven feet two inches . . . the Kittyhawk is particularly adept at getting in and out of small rough fields . . . a factor which enables even the inexperienced pilot to land under unfavorable conditions . . . with a greater degree of safety.

SPECIFICATIONS
Kittyhawk Model B-4

Engine—Kinner K-5 100 H.P. Approved Type Certificate No. 166	
Length overall	22 ft. 11 in.
Height overall	8 ft. 8 in.
Span both wings	28 ft.
Chord both wings	4 ft. 6 in.
Wing area	233.4 sq. ft.
Weight empty	1107 lbs.
Useful load	768 lbs.
High speed	110 m. p. h.
Cruising Speed	90 m. p. h.
Landing speed	38 m. p. h.
Climb	1200 ft. p. m.

THE VIKING FLYING BOAT COMPANY
89 Shelton Avenue, New Haven, Conn.
Miami Hangar — The Viking Flying Boat Company (Florida) Inc.



The NEW U.S. Valve Refacer
True! Foolproof!

NOW your cheapest help can reface valves quickly—and be sure of getting finest results—with the new up-to-the-minute U. S. Valve Refacer. It's foolproof—and turns out smooth, true jobs without difficulty.

It grinds valves having a $\frac{5}{8}$-inch diameter stem or less, of any length, with heads up to 6-inches diameter, and from 15 to 90 degrees. Besides, the U. S. Valve Refacer can be equipped easily with grinding attachment for both straight and spiral reamers, rocker arm grinding attachment, tappet grinding attachment, and attachment with micrometer adjustment for grinding ends of valve stems.

Grinding wheel and valve spindle turn on SKF Ball Bearings, and are operated by separate, belt driven, universal motors (for A.C. or D.C., 60 cycles or less). Comes complete with diamond wheel dresser, cutter grinding indexing support, and electrical connections. Larger chucks and steel table with valve rack also can be furnished if desired.

Ask Your Jobber or Write Us

$150

THE STANDARD OF QUALITY SINCE 1897

THE UNITED STATES ELECTRICAL TOOL COMPANY

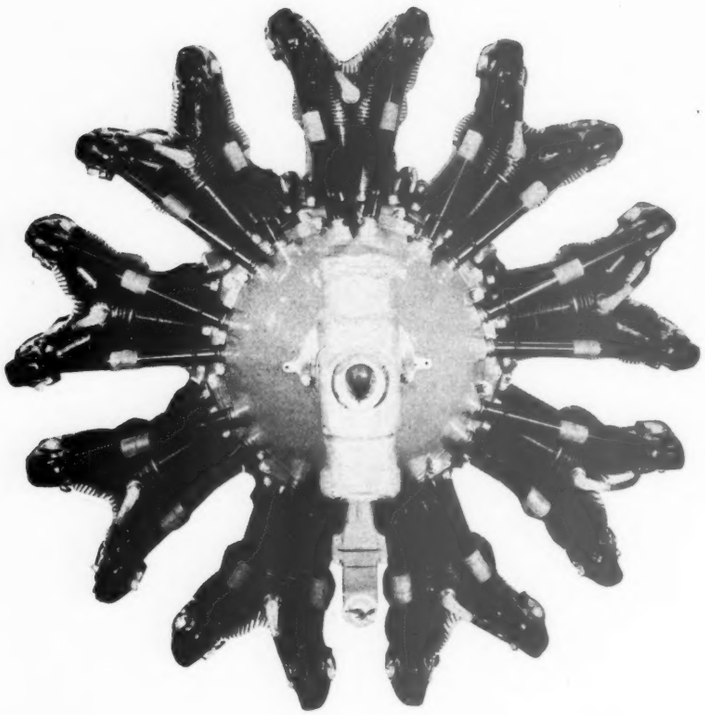
Oldest Builders of Electric Drills and Grinders in the World

2466 West Sixth Street — Cincinnati, Ohio, U. S. A.

Atlanta · Boston · Chicago · Cleveland · Dallas · Denver · Detroit · London · Minneapolis · New York · Philadelphia · Pittsburgh · St. Louis · San Francisco · Syracuse

Export Sales Representatives—WESTINGHOUSE ELECTRIC INTERNATIONAL CO.—150 Broadway, New York City

Another member of a famous family—



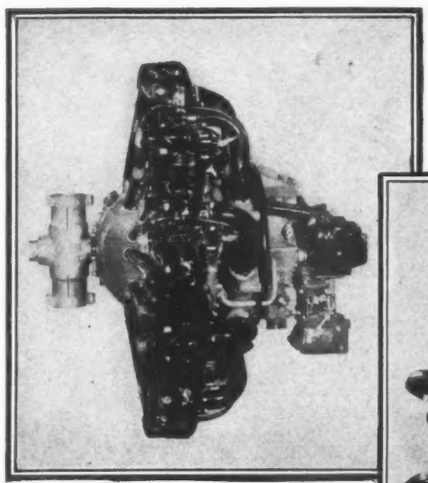
Wasp Junior

a 300 H. P.

ENGINE, BY

PRATT & WHITNEY

PRATT & WHITNEY U.S.A.
DEPENDABLE ENGINES



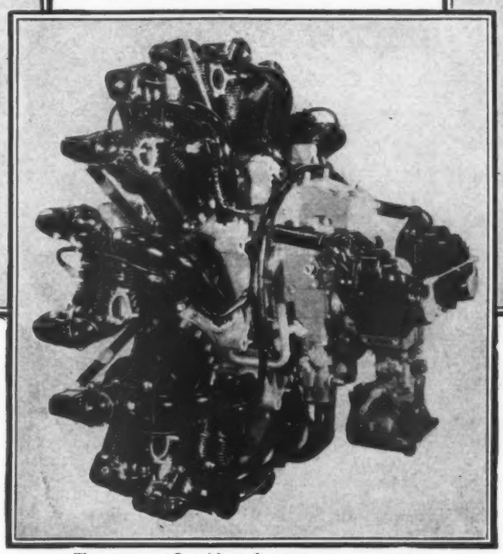
Full Side View

To the individual owner

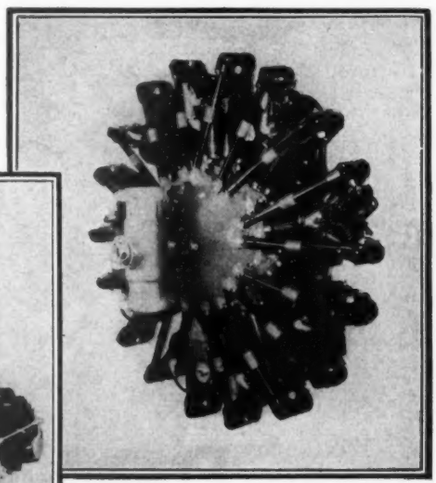
"Wasp Junior" combines dependability with high performance, low initial cost and economy of operation.

To the manufacturer

"Wasp Junior" simplifies production problems by meeting customers' demands for differently powered and variously priced equipment with standard installations of these World-known engines.



Three-quarter Rear View showing accessory section



Three-quarter Front View

To transport operators

"Wasp Junior" brings a complete line of Pratt & Whitney engines from 300 to 575 h. p. . . . serviced with a minimum stock of parts and one service contact.

A 300 H. P. "Wasp" . . . a product with a background of history . . . of outstanding achievement . . . a "Baby Wasp" . . . with 80 per cent of its parts interchangeable with those of the world-famous "Wasp" and "Hornet"—that's the "Wasp Junior" . . . which now invites your inspection and critical comparison.

New only in name . . . "Wasp Junior" combines expert engineering with the experience gained in millions of miles of flying.

It has all the performance characteristics that have made the names "Wasp" and "Hornet" stand for "dependable flying power" under every operating condition.

Weighing 550 pounds and 45¾" in diameter, "Wasp Junior" develops 300 H. P. at 2,000 r. p. m.

"Wasp Junior" was designed to meet the requirements for an engine of this size, having the dependability and long life that have made the "Wasp" and "Hornet" internationally famous.

To be manufactured in the most modern aircraft engine plant . . . now under construction . . . "Wasp Junior" will be produced to meet the full demands of the industry.

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PRATT & WHITNEY AIRCRAFT CO
HARTFORD - - - CONNECTICUT
Division of United Aircraft & Transport Corporation

Manufactured in Canada by Canadian Pratt & Whitney Aircraft Co., Ltd., Longueuil, Quebec; in Continental Europe by Bavarian Motor Works, Munich

Wasp & Hornet ENGINES

DOES YOUR CITY REALLY NEED AN AIRPORT- and if so what kind?

A-D-C-Specialists (ENGINEER · PILOT · EXECUTIVE) Will Advise You

WE do not believe that loading the taxpayers with something far more elaborate than they require has any part in the healthy growth of aviation.

We feel that our first function as consultants is to discuss impartially the primary question of whether the building of an airport is really warranted. If, in the light of our expert survey of conditions, the need for an airport *does* exist, A. D. C. coordinated service will design and build the type of airport that will meet the needs of your particular city.

AIRPORT DEVELOPMENT & CONSTRUCTION CO.

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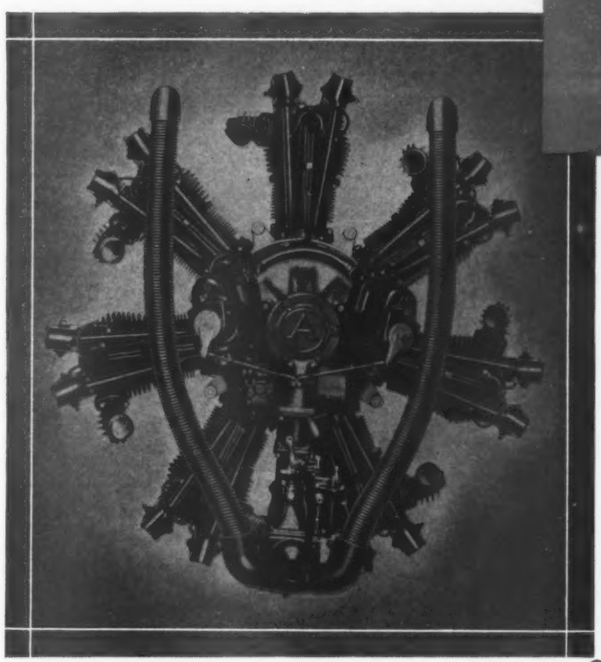

. . . . a part of Axelson *quality*

In keeping with Axelson quality, Stromberg Carburetors were selected as standard equipment on all Axelson Airplane Engines. Fuel feed is maintained in all positions of plane during maneuvers. The float mechanism is positive acting. Large strainers and fuel jets prevent clogging while altitude control mixture adjustment is effective through the entire flying range. Special accelerating means are furnished and combined with economizing device to give leanest usable mixture at cruising range and full power at wide open throttle. An idling jet provides priming well for easy starting. Catalog on request.

U. S. Department of Commerce Approved Type Certificate No. 16.

Axelson Aircraft Engine Co.

Factory and General Offices,

Corner Randolph Street and Boyle Avenue
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AXELSON AIRPLANE ENGINES

at ease in the air

Of two engines with equal power, that one is better which never exerts itself to the utmost—never strains itself in developing its rated power—never sacrifices strength for reduced weight.

This is the Comet idea—the first departure from wartime standards in aircraft engine design.

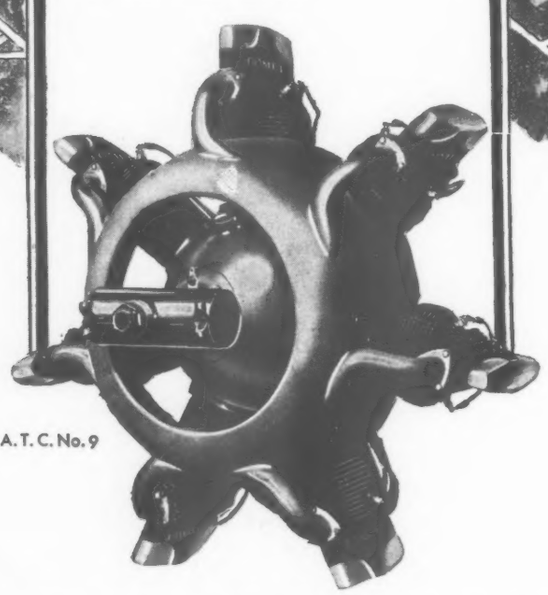
Men and women who take the air with Comet engines enjoy flying ease, because Comets always function well within their limits of mechanical strength, always hold an ample reserve in the interest of steady, unfailing operation.

Working without strain, Comet engines give hundreds of hours of uniform service, without overhaul or expert attention.

Comet brings to flying the same ease and certainty of operation that drivers of automobiles accept as a matter of course.

Theory says that aircraft engines should deliver maximum power for minimum weight.

Practice says that weight may be too low in proportion to delivered power. Reduced weight may mean reduced strength.



A.T.C. No. 9

COMET ENGINE CORPORATION

MADISON, WISCONSIN, U. S. A.

Comet aircraft engines are manufactured at Madison, Wisconsin, under the direction of the Gisholt Machine Company, for 40 years builders of fine machine tools in use throughout the world . . . 7 cylinders, 150 horsepower (manufacturer's guaranteed rating).

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"71" *with* · ·

Berryloid

AIRCRAFT FINISHES

The Fairchild Airplane and Manufacturing Corporation chose Berryloid Aircraft Finishes for superior "quality, appearance and durability." Kreider-Reisner planes are also finished 100 per cent with Berryloid. Nungesser Green and Vesta Yellow beautify the Fairchild and Challenger in the above illustration.

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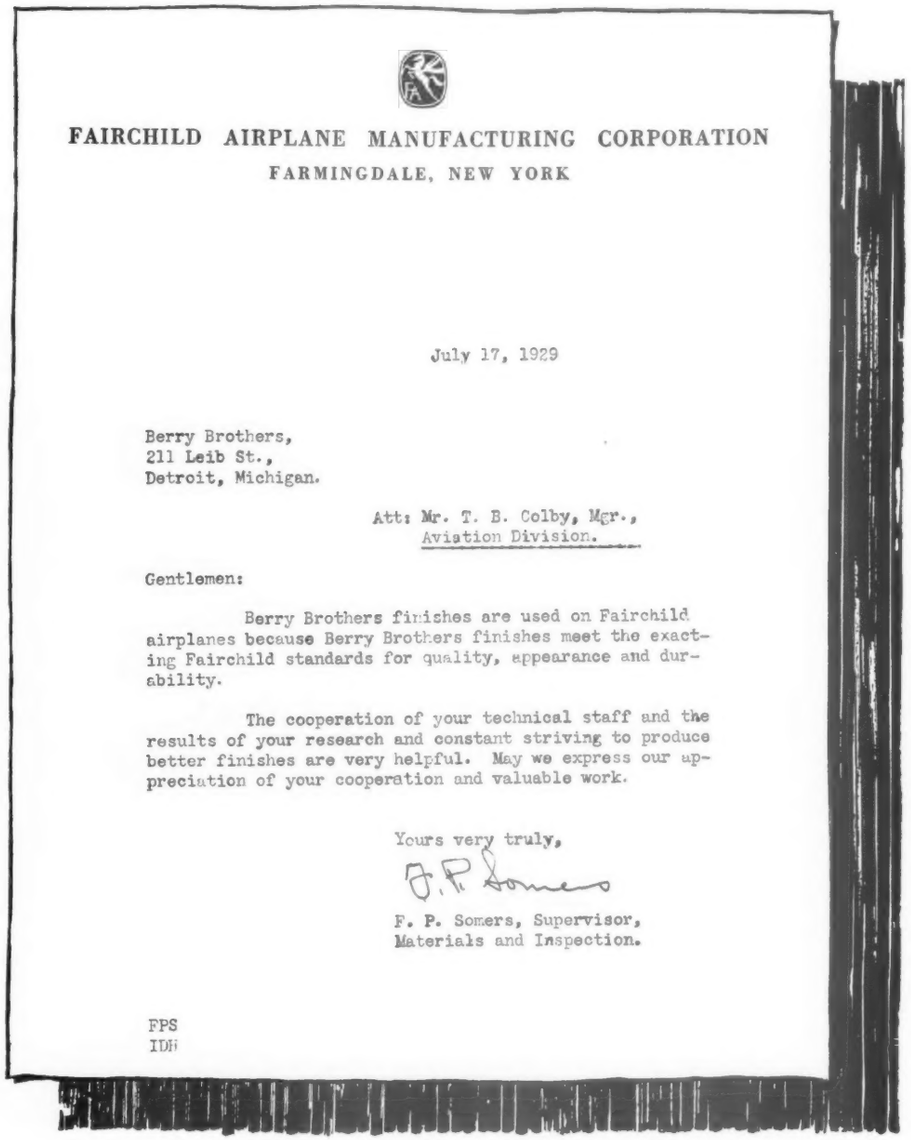

FAIRCHILD AIRPLANE MANUFACTURING CORPORATION
FARMINGDALE, NEW YORK

July 17, 1929

Berry Brothers,
211 Leib St.,
Detroit, Michigan.

Att: Mr. T. B. Colby, Mgr.,
Aviation Division.

Gentlemen:

Berry Brothers finishes are used on Fairchild airplanes because Berry Brothers finishes meet the exacting Fairchild standards for quality, appearance and durability.

The cooperation of your technical staff and the results of your research and constant striving to produce better finishes are very helpful. May we express our appreciation of your cooperation and valuable work.

Yours very truly,

F. P. Somers

F. P. Somers, Supervisor,
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Pat'd and Pat's Pending

"Hallowell" Semi-Portable Work-Bench of Steel

A Semi-Portable Work Bench on two casters—one you can trundle around from place to place; from job to job—how does that strike you?

Before the "HALLOWELL" Semi-Portable of Steel a work bench was a fixture—once in position, there it remained.

Not so with the "HALLOWELL"—grab the handles and trundle Bench and all to where you want it; let go, and the "HALLOWELL" lands on its two plain feet and becomes, at once, rigid as a rock.

And when the job is finished, roll the "HALLOWELL" away and leave it where least in the road, so floor and wall spaces can be used to best advantage.

Otherwise the construction is just like the now famous line of

"Hallowell" Steel Benching

Bulletins 386, 414, and 416—Yours for the Asking.

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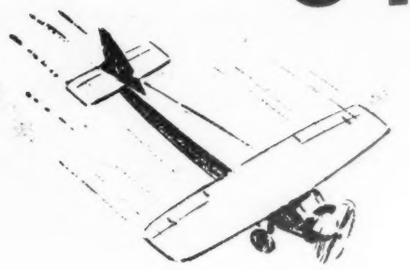
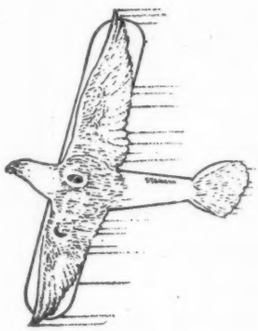


Then...

proved its incontestable stamina in countless flights as the utmost in AVIATION ENGINE LUBRICANTS



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BLAW - KNOX Galvanized STEEL HANGARS are the result of specialized engineering research to determine the most economical type of hangar construction to fill all requirements of airport or landing field.

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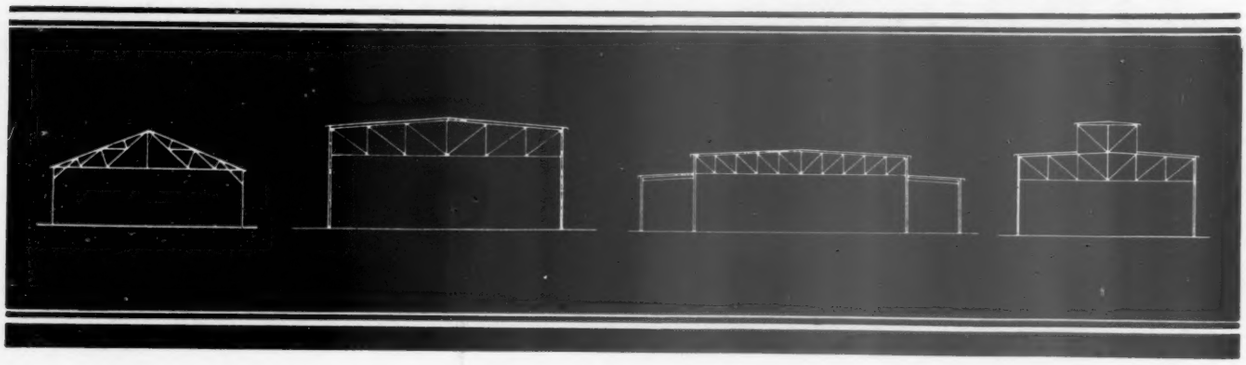

R. W. MACKIE is Operations Manager of Colonial Air Transport, Inc., New York and Boston.

East Boston Airport,
Boston, Mass.,
Sept. 29, 1929.

Mr. R. E. Lees, Sales Mgr.,
Waco Aircraft Corp.,
Troy, Ohio.

Dear Mr. Lees:

With regard to the outside loops accomplished by the writer in a Taper-Wing Waco on August 27th, at the National Air Races this year, I wish to advise that these were done solely for the pleasure involved. Being on my vacation, I "cut loose" and had a good time.

The speed attained, sometimes in excess of 300 m.p.h., and the placing of such a terrific strain on wings and wires primarily designed only for supporting the wings on the ground, might be expected to strain a plane severely. However, being thoroughly familiar with the rugged construction of Waco planes, I felt no hesitancy in doing a series of outside loops. I actually did nine that afternoon, as I tried an unobserved one well away from the airport, before doing the eight over the Races.

After landing, I found one wire in need of a half turn to bring it up to the proper tension. The rest of the rigging was OK - I had personally supervised a previous check of the rigging that same morning.

The outside loops at Cleveland were easily accomplished in comparison with the one previously done here at Boston when Freddie Lund had your Taper-Wing Waco here for demonstration. It had no gas tank on the landing gear, and the motor would quit before even a vertical diving position had been attained. I almost got over on the first two attempts - sans motor; and made it the third time by getting up a speed of 140 m.p.h., before even going slowly into a power dive. I can conceive of no greater punishment for an airplane than that particular dive and reverse loop. In all, I have imposed the strain of an outside loop on Taper-Wing Wacos twelve times, without being able to find any subsequent indication of stress.

Yours very truly,

R. W. Mackie

WACO
AIRPLANES
"ASK ANY PILOT"

America's Central Showplace

presents—February 15th. to 23d.—

The International Aircraft Exposition

As the most central and accessible Aviation City in the whole United States, St. Louis offers, with its huge Arena, unequalled facilities for the one officially-sponsored International Aircraft Show to be held during 1930.

Serving this natural center of Aviation is half the total railway mileage of the nation. Fast, direct transportation is offered to and from every section of the country. Nearer than to any other large city is the national center of population.

Unlimited hotel accomodations are here. Here, too, are four famous flying fields; five aviation schools; four airplane manufacturers; an engine factory; a great transcontinental airway headquarters; and scores of allied and subsidiary manufacturers. St. Louis presents, in itself, a lively picture of vital interest to everyone concerned with Aviation.

The new St. Louis Arena, just completed, is the largest permanent show place in the world. Its main structure seats 21,000 people. Flanking this are two huge exhibit buildings, each containing more than 86,000 square feet of floor space. Through their doors, planes are wheeled directly in from the adjacent landing field without dismantling.

Convenient spur tracks are on the grounds. The buildings face a main boulevard. The Arena is close to the center of the city. Union Station is only 24-minutes' streetcar ride distant. Cars and busses pass the door. Parking space for thousands of cars is provided.

Here, during February next, will be held the greatest Aeronautical Exposition ever undertaken. Everything new in Aviation, the latest developments from Europe and America, will be gathered here. Plan to be in St. Louis, without fail, during the third week of February!

THE INDUSTRIAL CLUB OF ST. LOUIS
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Detailed information relative to the International Aircraft Exposition can be had by addressing the Aeronautical Chamber of Commerce, 10 E 40th St., New York City.

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THIS BETTER METHOD OF HANGAR HEATING *saves money*

The men do their work faster and better in hangars heated with Trane Unit Heaters. Heat goes where they need it, down to the working level instead of up the walls and just under the roof.

When the hangar doors open cold blasts of air are checked—by proper placing of Trane Unit Heaters.

The planes, too, are protected from rapid deterioration caused by radiant rays from old fashioned radiation. Trane Unit Heaters give off none of these rays which warp fabric and struts.

These decisive heating advantages may sound high priced. But they are just the opposite. In a new installation, Trane Unit Heaters cost 30 to 40% less than equivalent cast iron or pipe coil radiation. And they save as much as 25% on your annual heat bill.

Get the whole story on this up-to-the-minute method of heating. Mail coupon today.

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HEAT WITH UNIT HEATERS

THE TRANE COMPANY, Dept. 12,
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Send complete information on Trane Unit Heating for hangars.

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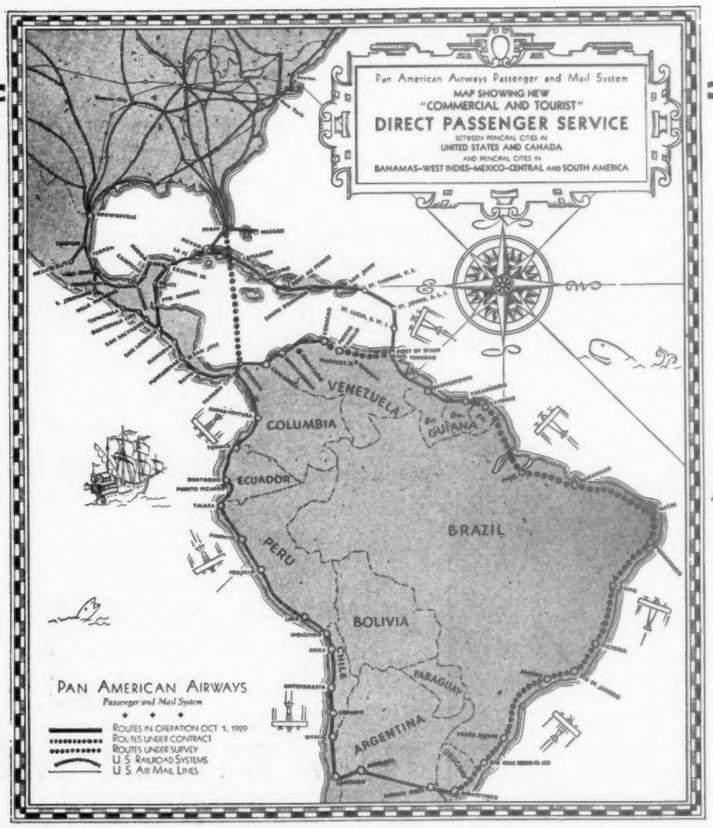

AMERICAN AVIATION and PAN AMERICAN AIRWAYS

BACKED by whole hearted cooperation of the chief American railroads and of important Groups in America's Aviation Industry, Pan American Airways has grown in two years from a single line of 261 miles, to the largest unified international air transport system, not only in the Americas, but in the world.

More than 12,000 miles of airways in the Pan American System provide mail and passenger transportation to and through the West Indies and Mexico, Central and South America.

Assistance of the United States Government in the form of airmail contracts made this growth possible. Enthusiastic cooperation of the Governments in Central and South America played an important part in developing the unified Pan American System.

Now Pan American comes near to fulfilling the ambitious promise of its name . . . an air transportation system reaching every American country.

Pan American Routes

Daily service from Miami to Havana has grown from one airliner to seven each day. Tri-weekly service to Nassau has become daily. Daily service (except Sunday) has been established throughout the West Indies—Havana, Santiago, Haiti, Santo Domingo, Porto Rico—with weekly service from San Juan to the Windward, Leeward, and Virgin Islands, Trinidad, and Paramaribo, South America. Tri-weekly mail service to Panama has been extended to include passenger traffic, for the first time bringing rapid, frequent transportation to Yucatan, British Honduras, Honduras, Nicaragua, and Costa Rica.

Meanwhile, starting at Brownsville, Texas, daily service was established to Tampico, Vera Cruz, and Mexico City. Now this line has been extended with tri-weekly service through Yucatan, and tri-weekly service through Guatemala, and San Salvador to Panama. East from Panama, a weekly service through Colombia reaches Curaçao. South from Panama, weekly service passes through Ecuador, Peru, Chile, and—crossing the Andes—reaches Buenos Aires and Uruguay.

Through Rail-Air Service

Complete reciprocal traffic arrangements with chief American railroads provide through Luxury service. It is possible to procure through tickets and reservations at most important railway offices to any point on Pan American Airways—from any point on the airways to chief centers of the United States.

These various achievements, taken together lessen immeasurably the distance between country and country. They represent perhaps the strongest force operating today for Pan American understanding and friendship.

PAA

PAN AMERICAN AIRWAYS, INC.

122 EAST 42nd STREET, NEW YORK CITY

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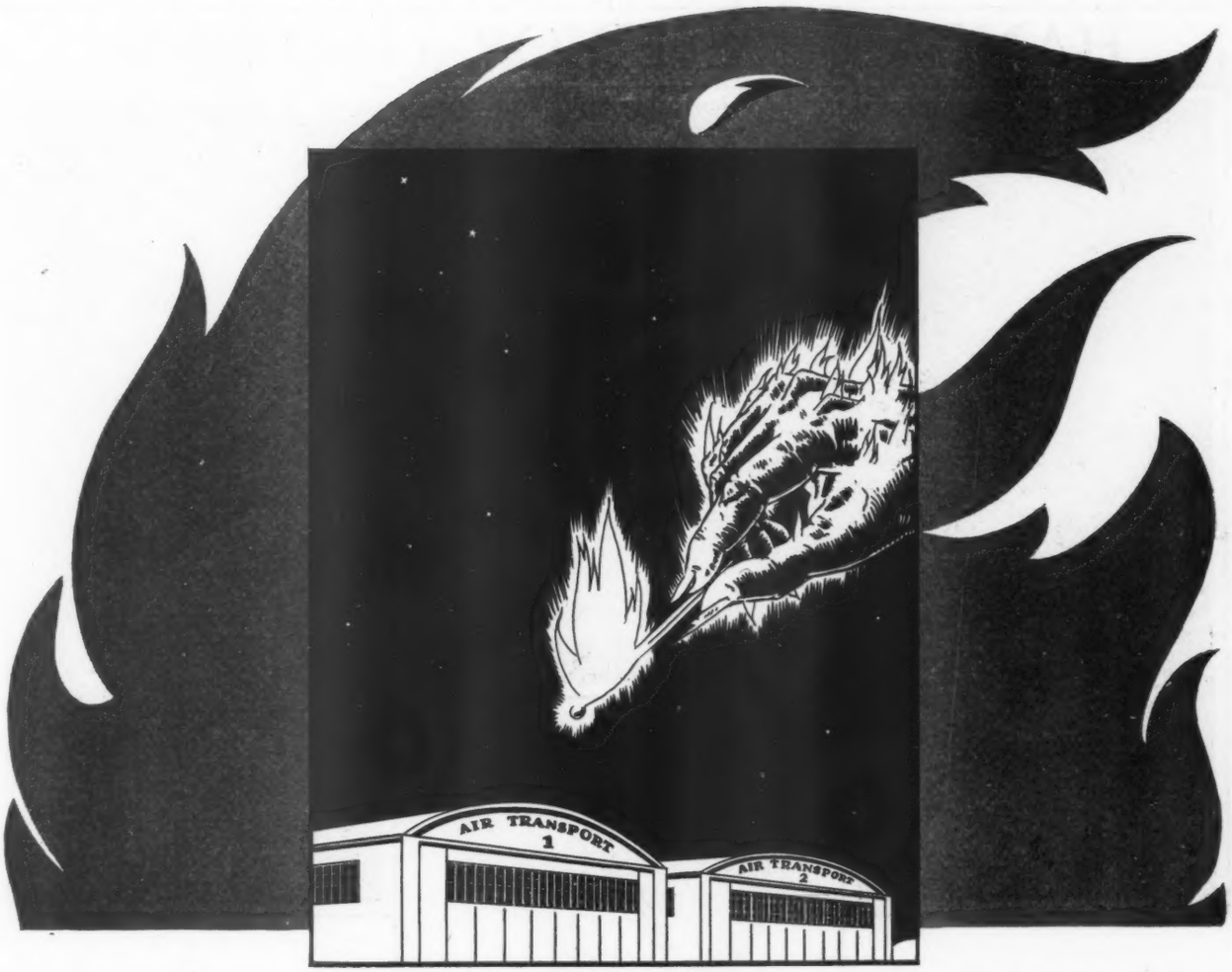


Fire! The shadow that haunts the hangar!

Grim, purposeful, ready to pounce on man's carelessness, Fire sees hangars and airports as fertile fields for attack. Crowding of planes; the presence of gasoline, oil and other extra hazardous materials; the difficulty of getting planes out of the hangar quickly—all cooperate *with* Fire and *against* you!

Are you *sure* that the Protection that you have is *real*; that it is as complete and certain as human care can make it? How safe are the planes in the hangar from Fire? How well is your airport equipped to fight Fire when it comes—for sooner or later *it will come!*

The first five minutes of any fire's life are vital minutes for you. Quick action with the *right* fire extinguisher can confine the damage to a small area. American-LaFrance and Foamite products include every type of recognized fire fighting devices from one quart extinguishers to the largest motor fire apparatus. From a background of 84 years, American-LaFrance and Foamite can authoritatively recommend correct protection for your airport—first-aid extinguisher equipment, automatic systems, or motor fire apparatus. This company's service analyzes your risk, installs the equipment, instructs your employees in its use and, if desired, inspects and maintains the equipment.

* * *

Send for "Sinister Beacons". This booklet describes the fire hazards of airports and the protection given by the various types of American-LaFrance and Foamite equipment. American-LaFrance and Foamite Corporation, Engineers and Manufacturers, Dept. T56, Elmira, N. Y.

American-La France and Foamite Corp., Dept. T56, Elmira, N. Y.

☐ Please send me your booklet "Sinister Beacons."

☐ Have a Fire Protection Engineer call.

Name.....

Company or City Dept......

Town or City.....

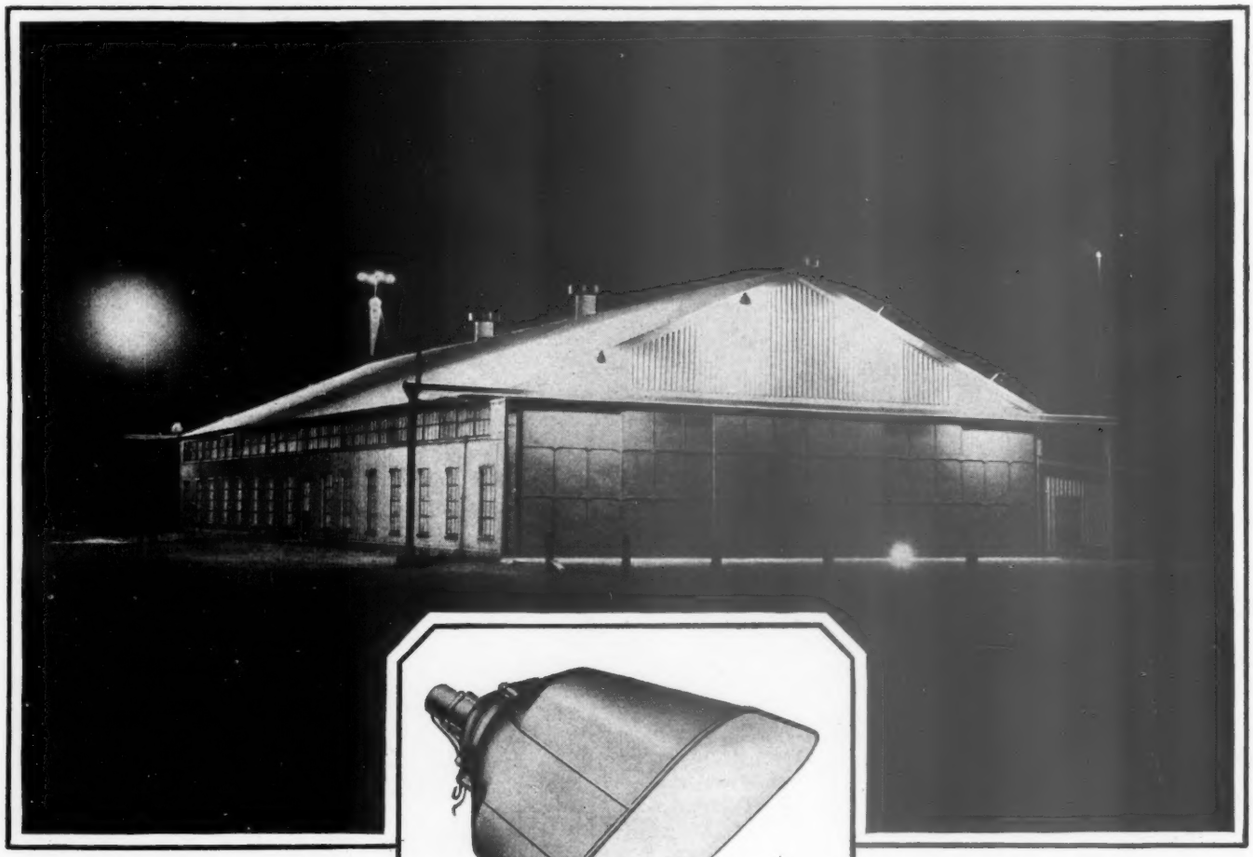
State.....

AMERICAN-LAFRANCE AND FOAMITE PROTECTION

A Complete Engineering Service

For Extinguishing Fires

HANGAR EXTERIOR LIGHTING



Type MSA1

In order that a pilot landing his plane at night may have some perspective whereby he can judge his distance from the ground, the buildings at an airport should be illuminated.

The most effective way to accomplish this is with floodlights. Type MSA1 Floodlight is an ideal type of unit for this service. It is a large open type, wide angle, short range projector. The housing is of non-corrodable cast aluminum alloy. The inside surface is finished with a special heat-resisting white paint of remarkably high reflecting power. A cast iron slip fitter for standard 4-inch pipe mounting or a steel bracket for wood pole mounting is furnished.

The Crouse-Hinds Company manufactures everything in the way of airport lighting equipment and will, upon receipt of detailed plans, lay out an economical lighting system for your airport.

Everything in Airport and Airway Lighting Equipment

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PERFORMANCE THAT COUNTS!

The majority of modern American Aeronautical Engines are equipped with Scintilla Aircraft Magnetos

Scintilla Aircraft Magnetos have won the entire confidence of Mechanics and Pilots by their proven Reliability in the severe service of commercial operators.

Scintilla Means
DEPENDABILITY
SIMPLICITY and
ACCESSIBILITY

Scintilla Aircraft Magnetos can be obtained for engines of from one to eighteen cylinders.

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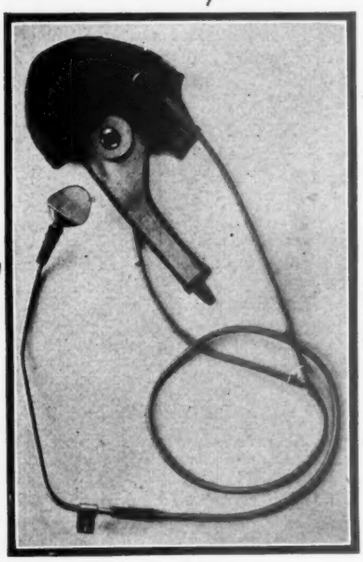
All that's Best in Aeronautical Supplies

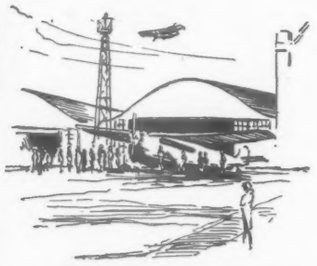
Johnson Speaking Tubes

End writing, pointing, yelling. A necessity in open planes, a great convenience in closed ones. Make conversation easy between pilot and passengers. Light in weight, easily installed, low in price.



Pilot's Suit

Developed from years of actual flying experience. Made for summer or winter service. Super quality with snappy appearance.



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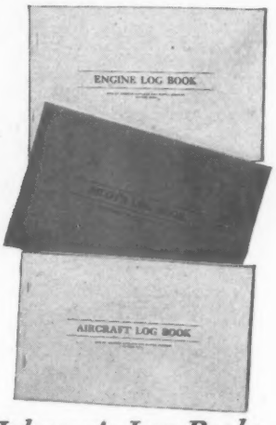
All leather, durable, easy to operate and install. Strong metal fittings, cadmium plated. All standard sizes, colors, finishes.



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HERE at Johnson's you can get "the best of everything for pilot, plane or port." We not only carry large and complete stocks of all standard equipment, but we also manufacture many extra good items ourselves. A few leaders from both lines are shown herewith, but in addition we are headquarters for Wind Cones, Tail Wheels, Air Speed Indicators, Pipe Fittings, Bolts and Nuts, Cables and Wire, Fabrics, Dopes, Finishes, etc.

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AT every point where petroleum protects or fuels this trimotored Ford of the S. A. F. E. transport line, dependable Skelly Aviation Products are used. A good aircraft engine deserves the best, and that holds true for school, military, private plane and racing craft as well as for transport duty. All Skelly products are made to the Skelly Standard: "Quality has no substitute."

Aviation Sales Department
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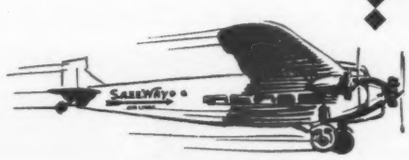

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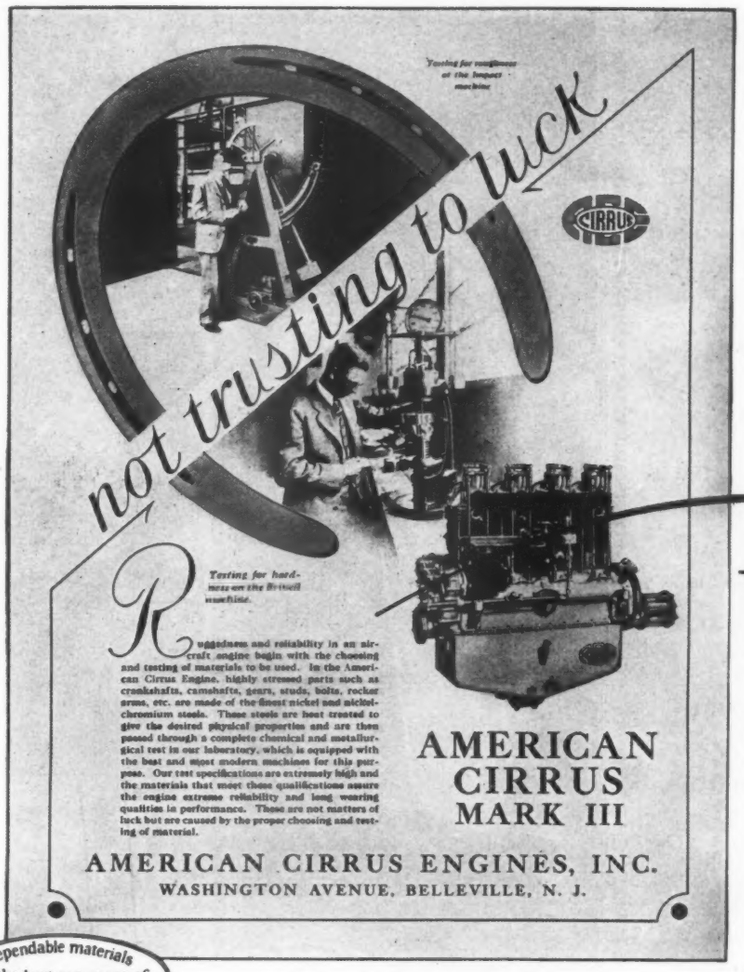
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AVIATION

The Oldest American Aeronautical Magazine

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HERBERT F. POWELL, *News Editor*
LESLIE E. NEVILLE, *Technical Editor*
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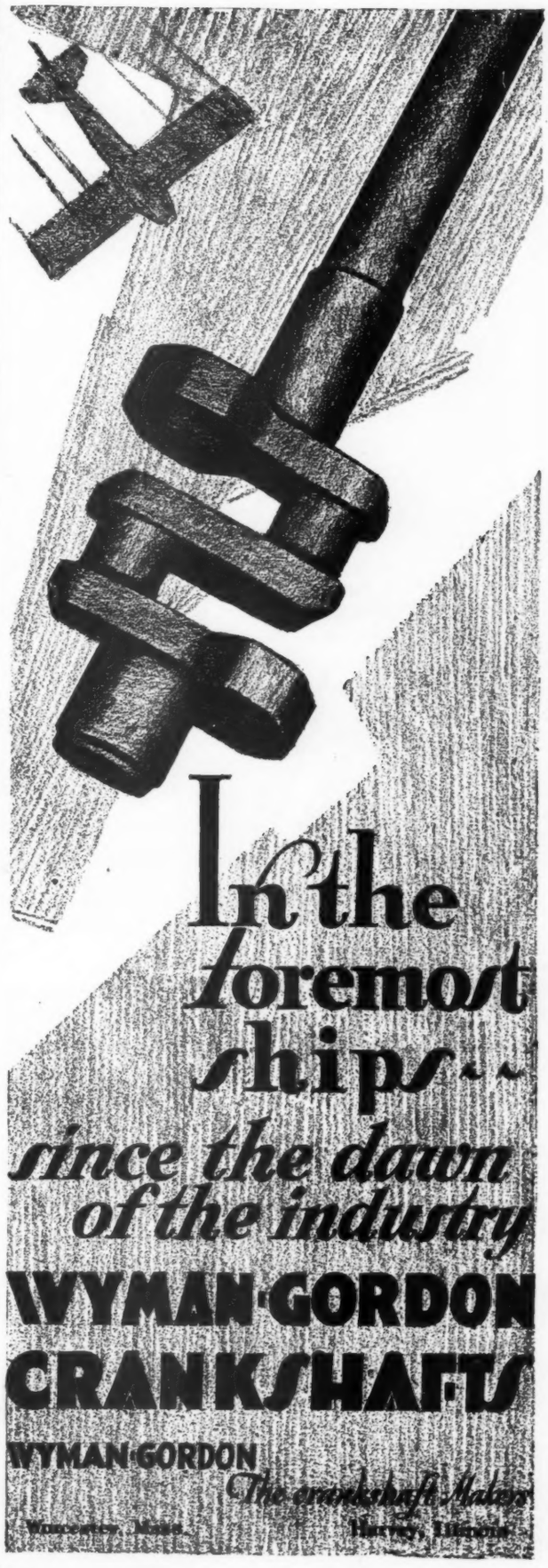

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AVIATION

THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

A McGRAW-HILL PUBLICATION . . . ESTABLISHED 1916

EDWARD P. WARNER, *Editor*

VOLUME 27 . . . **December 7, 1929** . . . NUMBER 23

Accident Causes in the Spotlight

THE SENATE of the United States having recently directed that the results of the official inquiry into the cause of the fatal crash of a passenger airplane on the side of a New Mexico mountain two months ago should be made public, the Department of Commerce has had no alternative save to comply. Material that has always heretofore been held sacredly confidential must be spread upon the record. A precedent has been created, and inevitably there will be repeated attempts to secure the same public exposure of the results of the Department's inquiries in other cases. The decision rests with Congress, which has full and unquestioned power in the matter. It is a decision fraught with great significance for the aircraft industry, and the industry cannot be indifferent to the course followed. From the point of view of aeronautical development both secrecy and publicity have their advantages, and we have balanced them against each other long and carefully before arriving at a conviction of our own on what would be the wisest policy.

Nothing does more to inspire public confidence than a frank facing of the facts. Let the notion get abroad that there is something sinister about airplane accidents, or that the industry dares not stand forth to tell the truth to the whole world, and the most preposterous rumors will fly abroad. We could not, if we would, prevent public knowledge of the fact that an accident has happened. There is then much to be said for making it known just how it happened and why, and especially for seizing the occasion to point out just what is being done to insure that lightning will not strike a second time in the second place.

Furthermore, publicity within the industry is good for the industry itself. The lessons of a transport accident are not confined to the company that suffers it. To print a detailed analysis is to render it less likely that anyone else will suffer a similar misfortune. The work of such organizations as the National Safety Council is based largely upon the application of hindsight, pounding home the lessons of the accident that should have been avoided. The operators of aircraft can learn to improve their safety record in the same school.

There is one side of the shield. We have tried to present it fairly. The arguments for publicity are cogent ones. But there is another side.

The first initiative for the reduction of hazard lies with the Department of Commerce. It is of the first importance that the Department should be able to get all the facts, and get them accurately. They must be secured as a basis for possible modifications in the Department's regulations and methods. They serve also as the raw material of those general surveys and classifications of accident causes that are periodically prepared, and that are of even more value as a guide to operators than separate studies of individual crashes could be.

It is of the first importance that the Department should get all the facts, but often it cannot be done if publicity is known to impend. The most pertinent information concerning an airplane crash is often possessed by but one or two people. If they can talk in complete confidence, they will almost always speak frankly. If they have to feel that they are talking for the newspapers they will be very cautious about saying what they may think but may not positively know, and they would be less than human if they did not seek to soften the implications of testimony imputing blame or incompetence to individuals who may have lost their own lives in the wreck. The esprit de corps of those who work in aeronautics is

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strong, and happily so. They never display any eagerness to close the issue of an accident by the simple expedient of finding a dead scapegoat.

Likewise, the Department itself often has to speculate in its report, for lack of positive information. Where the sole object is to extract information useful in avoiding a recurrence of the accident, it is quite permissible that the plot be filled in by as much guessing as necessary. In a report destined to become a public record, such a course would be inexcusable.

On the whole, we believe that for the present the Department's policy of secrecy is wisest, and should be left undisturbed. We believe that the trend will be toward more publicity, gradually attained by making the periodic accident reports increasingly specific, and by including detailed analyses of certain accidents of special technical interest but denoting them by symbols and preserving as much anonymity as practicable. Five years hence it may be advisable to make public as full an official report upon each transport airplane crash as is now made on a railroad accident. We doubt even that, but in any case we are quite sure the time is not yet.

At least one thing is perfectly clear. Whether there be full publicity, no publicity, or partial publicity, the control in the individual case should be by the Department of Commerce, not by spontaneous senatorial whim. Already public report has been required upon one disaster (not the New Mexico one) which had no technical features of special importance, for no apparent reason except that a member of Congress was personally interested and made his interest vocal. The decision in the individual case, if there is not to be complete uniformity of treatment, must depend upon the facts of the accident itself, not upon the political pull, or the personal friendship with a Congressman, of someone who has either a personal grievance or a pending damage suit against the owner of the plane involved. That point is serious. It is serious enough to deserve the attention of the sober Congressional leaders who can prevent the rushing through of more resolutions for publicity or for renewed investigations.

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Why the Highways?

THIS YEAR saw the motor-boat owners of New York State, tired of paying gasoline taxes for the support of highways, form into battle line and successfully overthrow the patently ridiculous assessment.

Airplane operators of many states are paying the same unjust excise and funds which are obviously needed to round out our aviation program are being devoted to incongruous uses in connection with highway development and maintenance. Gladly we note signs of protest and resentment.

We do not feel like placing the onus entirely upon the state legislatures. When such excises were provided for by statute, few people ever thought that gasoline and flight would ever have the remotest relationship. In fact, they didn't believe in flight at all, and were even cool toward the automobile. It may safely be assumed in most cases that the only reason plane owners in most states are paying gasoline taxes is because no one has reminded the legislator of the obvious need for an amendment to its particular tax statute.

In one state which provides more than its quota of gasoline and a fair share of planes to consume it, the lawmaking bodies are resentful of every effort to free the aviation industry of this unnecessary burden. This is undoubtedly because they feel that the plane is not a part of the states' economic picture, but an instrument of recreation and amusement. As a matter of fact, this particular state probably benefits as much from the use of airplanes as any in the Union.

As an alternative, and admitting for the sake of an opportunity to show the other side of the situation that some fuel tax may be rightfully expected of airplane owners, why not divert such income to the development of intermediate landing fields? Why do not the states themselves assume some of the burden now so ably borne by the Federal Government? Certainly they may expect the cooperation of Washington to such an end, and with the problem of financing the program partly solved by the assurance of an income, it is not unreasonable to anticipate a very great deal of good, redounding mutually to the commonwealth and the aviation industry.

//

Marking Blankville

A NEW ENGLAND correspondent reports growing popularity for a new form of civic service. Painting the name of the town in magnificent yellow letters on the most conspicuous available roof has become a favorite pastime. Young and old, agile and infirm, men and women, they have all seized brushes and buckets of chrome-yellow liquid and started to climbing ladders.

We can only hope that the report is true. It seems almost too good to believe. Hope long deferred has made the cross-country pilot's heart sick. Eleven years have passed since the armistice. Non-military voyages by air have been a commonplace during two-thirds of that time. The American Legion, the Exchange Clubs, the Guggenheim Fund, and Chambers of Commerce without number have stood behind campaigns for the promotion of universal air-marking. Yet even now the traveler by air realizes to his sorrow that the town that is marked is extraordinary, a shining exception among its fellows, and any definite and vigorous action, such as is now rumored

to be manifesting itself in the six northeastern states, is still a nine days' wonder.

There are some parts of the country where air-marking is practically unknown. There are none where it is much more than fragmentary, or where need for further effort is lacking, although some districts, notably California and New England, shine brightly by contrast with their less energetic neighbors.

In most cases there is no direct advantage, save possibly a little temporary publicity, to be gained from identifying the community for the air pilot. The action is one of almost pure altruism, but unless communities act, and not merely a few here and there but hundreds or thousands of them, cross-country flying can never be as simple as it should be, especially for the amateur of limited navigational knowledge.

If the immediate return is small, so also is the cost and the difficulty of the work. All that is needed is a little enthusiasm. Attempts to generate it on a national scale through national organizations have met with only a limited success. They must be supplemented by local pressure from those who are keenly and personally interested.

No chapter of the National Aeronautical Association should rest easy as long as there is an unmarked town within fifty miles of its headquarters. No chamber of commerce that has an aviation committee, and most of them have by now, should fail to assume the responsibility both for getting its own town marked and for working upon less progressive neighbors.

Compulsion would of course solve the problem. It may even prove to be necessary, and at least one legislature has already flirted with the idea of imposing upon each town or city government the definite obligation of identifying itself forthwith. The possibility of employing such a legal club is one to bear in mind. We still hope, however, that civic pride, properly stimulated, may suffice. To stimulate it is a task, and should be a welcome one, for those actively interested in aeronautics. If all of us who are so interested take the matter seriously, we should have early and frequent occasion to report progress.

//

International Boundaries and Commercial Aviation

AXIOMATICALLY, the essence of aviation is speed. To whittle away the speed of air transport is to annihilate its usefulness. To entangle international flying in a maze of time-wasting red tape is to remove the reason for its existence.

In a general way, the truth of those trite observations is recognized. Periodic efforts have been made to simplify the procedure of customs examination, of immigration inspection, and in general of all that mass of formality that traditionally attends the transfer of passengers and goods from one national sovereignty to another.

We certainly have no wish to belittle what has already been accomplished by the efforts of the Treasury Department and the Department of Commerce, working with what co-operation other countries have felt disposed to offer, but more is needed. We are encouraged to note, as representing not a final action but a symptom of continuing interest, that aeronautical procedure has engaged the special attention of the (take a deep breath before saying it) Pan-American Commission on Customs Procedure and Port Formalities, just adjourned in Washington.

The rules developed through centuries of experience with merchant shipping barely offer a starting-point. A wait of a few hours in quarantine at the end of a three-thousand-mile ocean voyage is annoying but seldom disastrous. A delay of a few minutes in completing an aerial trip is much more fiercely resented by passengers who have paid liberally for extra-rapid travel, and their resentment is likely to be visited upon the transport line.

Smuggling by airplanes cannot be overlooked. It has unfortunately been rather prevalent. Measures have to be taken to check it, but they ought not to involve detaining any air line passenger more than ten minutes from the instant when his plane taxis up to the disembarkation platform until he is free to go where he will and take his baggage with him. European governments have generally speeded up their routine at least to that extent. We ought to be able to do better in the western hemisphere—but we shall never do it by taking the rule-book for the official reception of ocean liners and going through it from A to Z.

It is not exclusively or especially to our own government that these remarks are addressed. Our travelers are even more seriously affected by the rules in force in the foreign lands that they visit. Nor is it only in connection with the regular transport lines that the subject is important. They have been able in some cases to make special simplifying arrangements with governmental authorities and to minimize delays by gaining the personal confidence and the co-operation of officials. Of almost equal concern is the status of the itinerant traveler by air. Experience upon the Graf Zeppelin's first arrival in the United States a year ago afforded a brilliant example of the unhappy consequences when a determined adherence to an inflexible routine is superposed on an inadequate understanding or preparation by those responsible for an aircraft's operation. To avoid future difficulties, there should be constant attentiton, for some time to come, to the development of improved procedure and the issuance of specific instructions for dealing, without friction or delay, not only with regular aeronautical operations but with aeronautical emergencies.

LOOKING AHEAD IN *Airport Lighting*

Fig. 1: Experimental Beacon Used at the Cleveland Municipal Airport. In addition to the several projectors so designed and aimed to produce a solid sweep of light through the upper 180 degree hemisphere, a duplicate set of projectors has been provided. These are fitted with red cover glasses so that as the beacon rotates, it alternately sweeps a path of red and then white light through the sky.

WILL THIS lighting system meet the Department of Commerce requirements for an "A" rating? That seems to be the question of primary concern to airport managers in discussing or in planning airport lighting facilities. The managers of operating companies and private aircraft owners, however, for whose use the facilities are provided, should have a somewhat different criterion for judging lighting provisions.

The viewpoint of the municipal airport manager can be justified from the fact that municipalities, suddenly projected into the business of airport administration, with the inevitable requirements of bond issues for land, grading, sewers, buildings, etc., find the element of cost a very important one. This has been a considerable factor in limiting desirable lighting practice because the result has been to provide the barest necessities as far as lighting is concerned. These provisions have apparently taken care of the relatively few night plane movements, coupled with the fact that most of the pilots doing night flying were experienced and extremely resourceful.

THE EXPEDIENCY of aviation in meeting public needs will depend more and more upon night flying as a matter of course. Lighting, therefore, is of prime importance to the success of the industry. It is significant that lighting is one of the three major aspects on which an airport obtains a rating from the Department of Commerce, yet the standards set up are in the nature of minimum requirements and as such are more properly to be worked *from* rather than *to*. While minimum standards are necessary, they oftentimes react to limit progress, particularly so as competitive bids and awards are usually based on minimum standards and lower costs.

While the general requirements of lighting for night flying are fairly well understood and developments in lamps and equipments to meet these requirements have been made, it cannot be considered that the solution of the problem is at all standardized. The present practice in airport lighting has grown out of the necessity for providing some sort of illumination largely for the service of the air mail. As flying becomes more general, new standards will be demanded for the convenience and general sense of security and well-being which the public quickly learns to expect. Airport lighting will effect

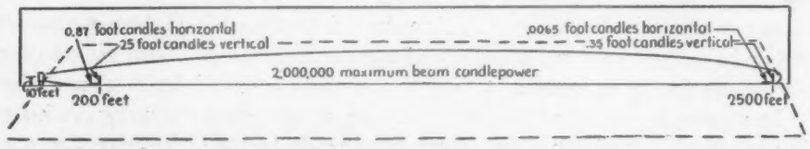


Fig. 2: Illumination readings on horizontal and vertical planes taken 3 feet above the ground for two locations on field, at zone of maximum projected candlepower

By C. E. WIETZ

Development

A Discussion of Lighting Conditions and Problems as They Exist Today and the Improvements Necessary to Future Development

in no small way the general acceptance of night flying.

From the standpoint of the aircraft operator, obviously, minimum standards are inadequate. His concern is in the maximum of safety, general utility, and expediency of traffic operations that the best system can provide. In his business as in all other business the advertising value of light will be a factor in the promotion of his services. To inspire confidence and build up patronage for air travel, no factor is more important than adequate airport lighting.

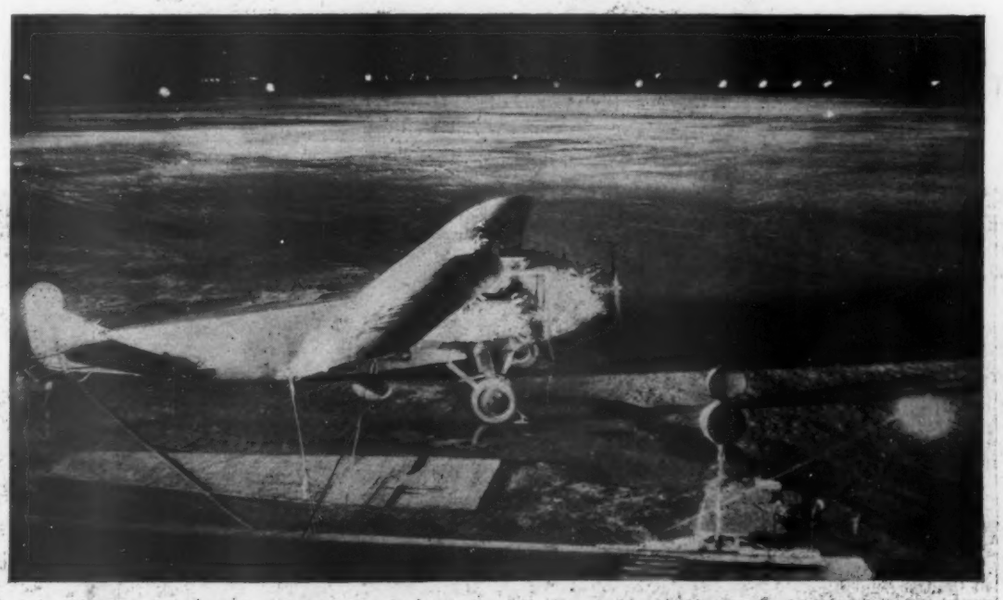
The cost of the best lighting system is small, compared to its service in extending the use of an airport throughout 24 hours a day. Furthermore, a single serious accident—aside from the danger to human life—due to inadequate lighting might involve more expense than the entire cost of the best lighting facilities.

THE TIME MAY COME, with the development and perfection of scientific instruments, when aircraft may be operated without demands for clear seeing outside of the cockpit or control room. At the present time, however, it seems only sensible to provide the best system of illumination that it is possible to devise. Instrument flying in its most practical development is a sort of synthetic vision and it is doubtful if it can be substituted in whole for the self assurance and mental satisfaction of actual seeing what there is to see. Under normal conditions of visibility, how well we see depends largely on how well we light.

The aviation industry in its lighting provisions can well profit from the experiences of other industries and other commercial pursuits in their attitude toward light and lighting economics. Industries today are employing ten to twenty times as much light as they considered necessary a few years ago. Although they were able to operate with a lesser amount of light, they have found that the decrease in accidents, lower spoilage, and increased production offset many times over the additional cost of more light.

Take outdoor sports at night. That is more comparable to the subject of airport lighting. A few years ago, the practicability of lighting up large outdoor areas for night sports—football, horse racing, golf, and the like, was seriously questioned. We have grown up with the instinct to be meager with light.

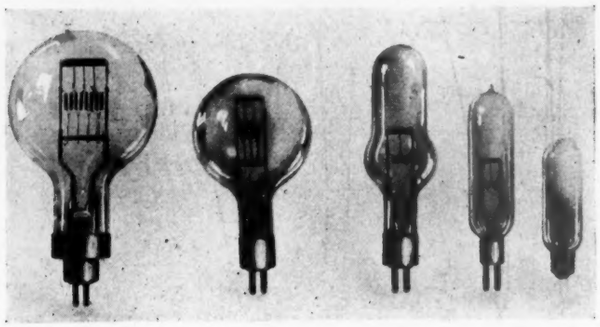
Last June there was installed at a Toledo race track about 180 kw. to light the track. This corresponded roughly to 6 foot-candles of illumination over the entire mile course. The drivers did not want to risk injury to



Night view of Cleveland Municipal Airport with one 24-kilowatt incandescent floodlight.

their high priced horses under a lower standard of illumination. In order to meet airport rating regulations for an A rating at least 0.15 of a foot-candle must be provided over the landing field. Only one-fortieth as much light for the safety to life and property of the aircraft operator as was provided for success and safety of horses racing doesn't seem to be a very reasonable or satisfactory condition.

Here, there, and everywhere are springing up practice golf courses of 10 to 15 acres, lighted after a fashion that would delight any pilot as an oasis of light in a desert of darkness. Baseball games have been played at night. This year many football fields are being lighted for night play. As this is being written, a local college decided on



Aviation lighting needs have been spurred on and hastened lamp research and development, particularly in lamps of higher wattage. The lamps shown ranging in size from 1 to 10-kilowatts, have been developed largely for the aviation service.

Monday to light their field for a game the following Friday night. Forty-eight kilowatts of lighting are being used. Other conditions being suitable, a pilot could set his plane down on the 50-yard line and really see what he was doing. Even this modest installation should get an A-10 rating if graded on the basis of visual conditions. And for no more serious an enterprise than football. In this same city, the airport, from which there is much scheduled night flying, 20 kw. or less of lighting is doing duty as the lighting system for an active area at least ten times as large.

One interesting example of the use of light in other industries was the filming of the movie "Broadway" which employed over 4,000 kw. of electrical energy for lighting the set. This roughly was more wattage than was being used in the lighting of all the 10,000 miles of lighted airways, and in the lighting of all the airports in the United States at the time of release of the film early this year. More light for a single movie production than was provided for the safety and progress of air transportation over the 40,000 miles of day and night flying on established air routes!

This is not an indictment of the aviation industry on the count of negligence in lighting matters; it is offered only as a suggestion to be liberal-minded toward the use of light, and to look forward to improved methods that are certain to be more effective. It also implies that light, properly safeguarded as regards glare, is a partnership with the eye as far as vision is concerned and as we control light in quantity and distribution to the same extent do we control vision and how well we see.

THE AVIATION INDUSTRY has laid new problems at the doorstep of the lighting engineer. While the experienced engineer may understand the principles of light production, light control and light utilization, and understand fully the relations between light and vision, he must necessarily meet any limitations or restrictions imposed by inherent requirements of the new service. At the same time, his recommendations must be practical and in keeping with administrative and financial conditions.

In meeting aviation lighting requirements new lamps and new auxiliary devices and equipment have been developed. The art of light projection has been advanced. Modern high-powered light sources combined with refinement in design of projection equipment caught the popular fancy by virtue of the extremely high values of candlepower in which the new devices were rated. Unfortunately, these extraordinary figures imply to the layman unprecedented illumination results.

The Airport Rating Regulations on lighting define the

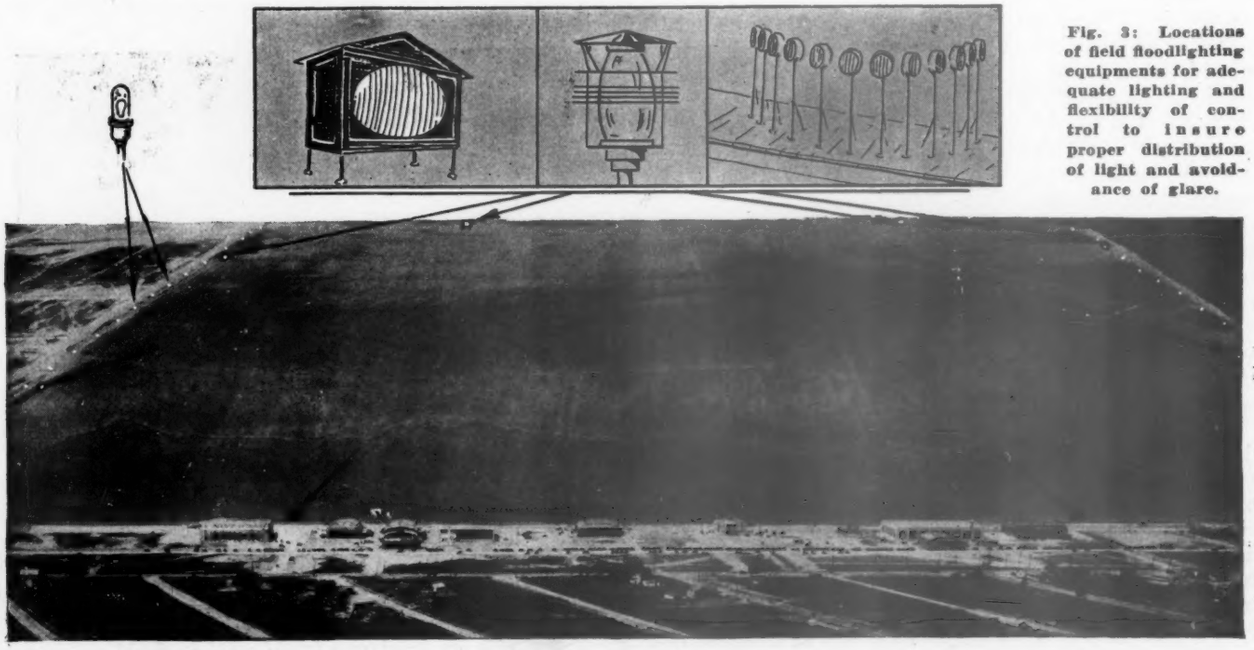
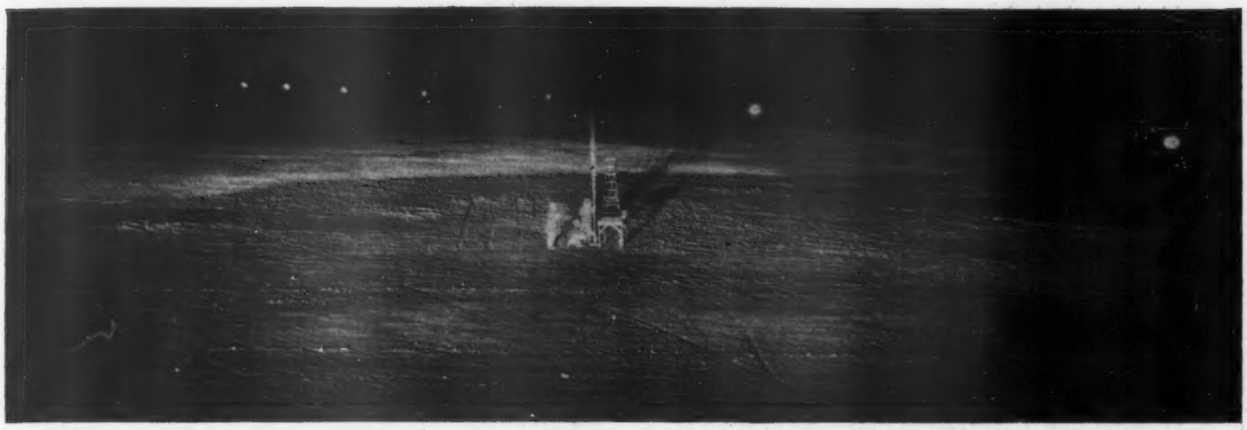


Fig. 3: Locations of field floodlighting equipments for adequate lighting and flexibility of control to insure proper distribution of light and avoidance of glare.



Engineers busily engaged in an all night task of photometric measurements and taking candlepower distribution data on an airport lighting installation. They scampered for the sidelines whenever a plane was heard.

various elements essential to aviation service. They specify minimum allowable values as regards safety and reliability of operation with minimum limiting values as regards results. They in no way restrict or hamper development and application of improved devices or methods.

The effectiveness of an airport beacon depends upon several factors:

1. High candlepower for long range visibility;
2. Visibility from all normal flying heights;
3. Suitable duration of flash period;
4. Positive identification.

In order to effect the greatest range of visibility, the beacon must develop a beam of extremely high candlepower. In practice, however, the relation between candlepower of a light source and visibility distance is dependent largely on atmospheric conditions.

If the beam is confined to a 3 to 5 deg. spread in an endeavor to obtain maximum beam candlepower, the effectiveness of the beacon is reduced because a plane at ordinary flying heights will benefit only for the short time it may be in the main beam. The latest U. S. Department of Commerce design specifications for airway beacons recognize this point in providing for a 25 deg. fan of light above the main beam. In addition four cylindrical lenses are provided in the upper part of the housing, which emits some light so that the beacon is visible from any position overhead. Any redistribution of light from a projector is, however, accompanied by a sacrifice of beam candlepower of the main beam.

A third factor enters into the problem in connection with the present aviation beacons, that is, the question of flash period. The standard beacons have a beam spread of about 5 deg. and rotate six times a minute. This does not allow the light to fall on the pilot's eye for a sufficiently long period of time to permit the eye to reach its maximum response. If the present rotating beacon is stopped in its rotation with the beam trained directly toward an observer the beacon appears to become much larger and more brilliant. A greater beam spread would therefore produce a more effective beacon.

Longer flash period can be obtained in two ways, either by slowing up the speed of rotation or by spreading out the beam. The former is not desirable because less than six flashes per minute allows a pilot to travel too far between flashes. Great increase in spread of the beam means loss in beam candlepower. Perhaps it may prove desirable to spread the beam somewhat and maintain present maximum candlepower, by using a somewhat higher wattage lamp than the present standard, or by using several lamps and several projector equipments each of which is designed to add its light distribution for the best effect of the beacon as a whole.

The latter possibility has led to the consideration of a multi-light projector as shown in Fig. 1. Two long range projectors are provided with their beams offset to increase the effective beam spread without the loss of candlepower. In addition, auxiliary projectors are provided of such beam characteristics as to create a vertical fan of light of relatively high candlepower visible from any location in the upper horizon.

The use of colored beacons, particularly red, was first advocated because of the general impression concerning the ability of red rays to penetrate fog.

The higher visibility of white light beacons reported by The Bureau of Standards (maximum candlepower) even during bad weather dictates their being retained, although it is recommended that they be supplemented by colored projectors for positive identification and pick-up. The night air map of a city is nothing more than a myriad of lights—street lights, lighted building signs, and flashes from automobile headlights, particularly where the streets and thoroughfares are rolling. Because of this, white light beacons do not call attention to themselves and are not picked up as quickly as are colored beacons which contrast with the lights of the city. It is felt therefore that the airport beacon should provide both clear and colored beams of high candlepower—the first for the greatest visibility under adverse conditions, the latter for quick and positive identification of the airport location. Where two or more airports are in close proximity, each airport might be assigned a particular identifying color.

VARIOUS REFINEMENTS in the design of boundary units are being introduced which show distinct advantages over the early slender stem units from the standpoint of daytime visibility and the elimination of certain hazards in event of collision. Early practice called for the spacing of boundary lights from 200 to 300 ft. The opinion now generally prevalent is that spacings of this order are too great to give the best results. This is particularly true of airports located adjacent to streets or highways paralleling the boundaries of the field and because of the closer spacing of street lighting units, it may be difficult to identify the smaller more widely spaced boundary light sources. Furthermore, a pilot passing over one corner of the field may have difficulty recognizing this as a cor-

ner; this is particularly true under adverse weather conditions when the units are spaced at considerable distances. If boundary lighting units are spaced from 75 to 125 ft. apart a pilot flying over any corner of the field will under adverse conditions of visibility be able to see a sufficient number of the boundary lights to orient his position with respect to the field boundaries.

The simplest specification for lighting landing fields, reduced to the fundamentals applied to other general lighting problems, can be stated in terms of lumens of light, or foot-candles, delivered per square foot of area. This is predicated on the generally accepted fact that the best illumination system for landing, taking off and general operations provides practically uniform distribution of light over the entire area.

A combination of circumstances has made it seem desirable to mount field floodlighting units only 10 ft. or so above the ground, and to attempt to sweep the entire landing area with a flat fan of light. With such an acute angle of projection, the zone of maximum candlepower must be aimed only the slightest amount below the horizontal plane in order to project light to the far boundaries of the field. Under these conditions of projection, the lower half of the beam falls on the field, while the upper half is lost as far as lighting the ground is concerned. With a narrow vertical spread and a sharp cut-off, this upper part of the beam produces in effect a layer of light above the field projected nearly parallel with the ground. Except when the atmosphere is extremely clear of dust or moisture particles, this upward light may produce a blanket of light sufficient to obscure the ground. In fact, some pilots have learned to gauge their height above the ground by the depth of the beam. On the other hand, if more light can be directed toward the ground and if the landing surface is light in color, the surface brightness will be high enough to overcome the apparent ground haze and allow the ground to be seen through the haze. This would appear to dictate a higher mounting of projectors and perhaps a modified beam pattern in order that the light might be directed more efficiently toward the ground.

WITH THE PRESENT SCHEME of low mounting of field floodlighting equipment the ratio between vertical and horizontal illumination is very marked. Fig. 2 illustrates some illumination measurements taken at 200 ft. and at 2,500 ft. from a 24 kw. 180 deg. aviation floodlight developing slightly over 2,000,000 maximum beam candlepower. It will be noted that at 2,500 ft. the vertical illumination is well over 0.15 ft.-candles minimum required by the Department of Commerce, but the horizontal illumination is of the order of 0.0065 ft.-candles or only about one-fiftieth of the vertical.

At 200 ft. the vertical illumination was of the order of 25 ft.-candles while the horizontal foot-candles fell to 0.87 ft.-candles. The ground in the immediate vicinity of the projectors appears fairly well lighted and favorable for landing with the beam, since the pilot has the advantage of absence of glare, relatively high ground illumination at the point where he grounds the wheels and has the further advantage of high vertical lighting on grass tufts, or weeds, that indicate the field conditions ahead.

On the other hand, if he is forced to approach from the far side of the field toward the unit, the horizontal illumination is almost negligible (the reading of 0.0065 ft.-candles is only about half what one could expect from full moonlight), so that the ground conditions are quite obscure; furthermore, he cannot benefit by the vertical illumination since he is on the dark side of all such obstacles.

Shadows caused by irregularities in terrain or weeds become particularly objectionable, for they are apt to give the pilot a false impression of the condition of the landing area. Small knolls casting deep shadows cause the latter to appear as deep holes or valleys.

These facts almost conclusively point to the futility of trying to light an area as large as an airport landing field adequately with one high-powered projector or battery of projectors; nor is it any more expedient to provide a number of projectors strategically located unless powered to deliver adequate light volume comparable to the area to be lighted.

BECAUSE OF the absolute necessity of avoiding glare as far as possible, the single high-powered source has been preferred to the system using lower powered sources distributed at many points around the field boundaries. When such single units are located with respect to prevailing wind direction, the pilot is free from glare the greater portion of the time since landings may be made over the unit and in the same direction as the projected beam.

Lighting engineers have for some time felt that the most flexible, safest, and most desirable system will require one, preferably two, high-powered units located on each side of the field. Such a system is illustrated in Fig. 3.

Provision should be made for at least 200 kw. of electrical energy for field floodlighting purposes. It is reasonable to anticipate requirements to this extent, not alone because maximum safety will be dependent on the use of more light, but equally for psychological reasons in that the well-lighted fields will go a long way to accelerate public confidence in the practicability of night flying operations.

With such a system, so installed that each unit is controlled individually from a single control point, the existing wind direction would dictate the particular units that would be lighted so that landing and taking off would always be made in the direction of projected light; subsequently, glare would cease to be a serious matter. Two, or three, or even four, units to the rear and right sides might be used simultaneously, thus regulating the amount of light as required for any occasion, or for adverse conditions of visibility. Furthermore, the use of several sources—glare free because of their location—produces a cross-direction of light, greater uniformity of distribution and eliminates harsh shadows cast by the plane, itself, or caused by rolling or wavy terrain.

Systems of this sort, where they have been installed, have proven most satisfactory and deserve serious consideration on all airport projects.

The matter of cost has been a deterrent to the full provision for adequate lighting facilities. Naturally, municipal budgets are not particularly elastic. Initial expense incident to the establishment of an airport has in most cases limited the appropriations for lighting. This in spite of the fact that no one denies that the success and value of an airport depends to a large measure on its lighting facilities. It is natural that we may expect lower costs on equipment as the demand increases and greater sales volume is obtained. Already noticeable reductions in cost of airport lighting equipment have taken place. Furthermore, as time goes on it is reasonable to expect that the cost of airport operations will decrease with the increase in air traffic.

WHAT PRICE Merger?

By TALBOT O. FREEMAN
Assistant to the President, The Aviation Corporation

THE DEVELOPMENT of aviation has suddenly reached the merger phase of the cycle. I say suddenly, because other comparable industries have taken decades to run the gamut of normal cycle phases which aviation has sped through in but a couple of years.

Some have even intimated that aviation's merger stage has been entirely artificially induced, and that its appearance at this time is out of place and premature; that, in fact, it is solely the child of the brains of certain powerful leaders in the industry who believe they can meet the threat of the small competitor through sheer size and wealth of resources. This absurd rumor is wholly unfounded. If anything, the great leaders have tried to induce a period of sane reckoning, which would allow aviation to proceed toward a stable and prosperous future on a firm foundation of assured public demand. In fact, aviation has reached the merger stage at this early period in its commercial history because the present great prosperity of America has produced an unusually large number of super-optimists who have been all too ready to risk their money on a pioneering venture. In this way there has been provided an inordinately large amount of capital which has produced a miscellaneous assortment of uncoordinated facilities, having not only no definite relation to the rest of the industry, but being even greater in capacity than the present traffic will bear. At any rate, aviation is now going through the merger phase because it *needs* the benefits of that expedient.

When the merger stage began, one heard everywhere: "But why should we merge with anyone? What advantage will we gain thereby that we cannot provide for ourselves without relinquishing our independence?" It is the purpose of this article to answer just these questions.

First of all, the early organizers of aviation companies were, by necessity, chiefly promoters. One was an ex-World War flyer who could not forget his first love. Another was a mathematical or mechanical genius who had invented a new wing curve or a new type of engine. A third, or financial type, saw the opportunity to make some real money on Government contracts. Still another, who knew all about some other business, was intrigued with the possibilities of this newest industry about which he knew less than nothing; and so on, ad infinitum. As a result, practically all companies to date have one trait in common, i.e., they lack sound management. One company has made big money in aviation for years, yet today it has no engineering department worthy of the name. Another has hardly a semblance of real production methods in its shop. The cost accounting system of a third amounts to subtracting the year's expenditures from the receipts, and dividing by the number of planes sold. Not only that, but the whole industry is in almost total ignorance of scientific market analyses. I am speaking now, of course, principally of the smaller independent companies.

ABOVE ALL ELSE, then, mergers of the right sort mean the acquisition of capable management. Watching the automotive production man, the machine tool expert, the cost accountant, the marketing specialist, and the well trained engineer standing in line to buy tickets for the big aviation tent, brings a great ray of warm sunshine pouring through a rift in the clouds after the storm. And, mind you, it is pressure from wise, experienced bankers which has forced into the large holding companies capable executives who recognize lack of fundamentals when they meet it—either in a plant or on a line. Furthermore, they know where to go to get the men they need to correct the discrepancies.

The promoter has filled a most useful purpose, for only he would have had the vision and belief to stick to the ship during the pioneering era. Now, however, he must get himself a partner or perish, for the competition is too keen for him to survive without the last word in modern methods. Some men who have the promoting spirit become good executives as well, but only after long years of struggle and training in good, experienced hands. Those in the industry who now feel at sea and do not know which way to turn, cannot be urged too strongly to seek a helping hand without delay. Unfortunately, however, inadequately managed companies usually do not recognize their weaknesses nor realize the nature of their dilemma.

Next in importance comes the question of research and technical advice. No one small company can afford to maintain a high grade technical staff, covering all phases of engineering and management; nor can it build and maintain costly laboratories and equip them with all the modern facilities necessary for complete investigation and analysis. This activity is much more im-

portant in the early stages of a new industry than later on. Inventions, new developments, and new methods are flooding the aviation business almost daily. Those who are prepared to take advantage of this situation will emerge, ten years from now, with flying colors; those who are not, after struggling a few years to market a perennially obsolete product, will simply expire of starvation. To complete the picture, let me mention but a few recent developments which merit the closest attention on the part of everyone, but which are quite beyond the scope of research of the average aircraft company today. (1) Diesel engines; (2) Slotted wings; (3) Metal construction; (4) Pontoons; (5) Amphibion landing gears; (6) Geared propellers; (7) Autogiros; (8) Dirigibles; (9) Comparative costs of operating multi-engined vs. single engined on a given line; (10) Comparative costs of operating engines at low speeds with infrequent overhaul vs. high capacity operation and frequent overhaul; Etcetera.

At this point we must not overlook technical assistance of another sort; namely, that which has to do with administration, and that which concerns Public Relations. In discussing the former, let us borrow a leaf from the book of one of aviation's largest and greatest holding companies:

> ". . . . . The management will emphasize the necessity for decentralized operations and responsibilities, with coordinated control. Such a policy is essential to an organization comprising a large number of separate and distinct operating divisions in all branches of aviation activity, each branch being a highly specialized business in itself . . . . .
>
> "Each division will be a complete organization in itself. It will be tied in to the Corporation largely through accountability only. The head of each division must assume full responsibility for the successful operation of that subsidiary; his function being, at the same time, tributary to the accomplishment of a central motive, i.e., operation for the benefit of the owners to whom the corporation owes its existence. Since it is only through service to the public that profit to the owners is assured, this motive is not inconsistent with the broader ideals of public service . . . . .
>
> "The Executive Committee will be guided largely by the advice of the active executives of the company, who, in turn will have available at all times the results of the surveys and investigations of a complete and competent staff of technical experts. Not only will laboratory research by this staff be emphasized but also there will be formed committees comprising leading executives of the various divisions encompassing each separate branch of aviation activity, such as Transportation, Traffic, Air ways, Equipment, Airports, Accessories, and the like. These latter committees will serve as clearing houses and sources of information for the various divisions operating in a given sphere. In other words, not only is the Corporation aided in the accomplishment of its purpose by the cumulative assistance of all divisions, but each division, in turn, must benefit by the experience of each other division. Finally, only by means of a corporation of broad scope could the lesser companies hope to maintain research laboratories and a technical staff. In this connection, it should be pointed out that an accurate presentation of facts greatly facilitates the agreement of many minds of different opinions. Disagreements fade away in proportion to the degree to which facts may be substituted for opinion, and agreement is, of course, the heart of coordinated control."

THE ABOVE PARAGRAPHS read almost like an essay of Emerson's. Considerable business acumen and broad understanding of human nature must have dictated those lines. With this spirit of wise administration behind a group of subsidiaries, it is hard to imagine anything but the finest of morale, loyalty, and enthusiasm; and no company is ever any stronger than its personnel. Nor can any small, wholly independent company possibly establish and maintain such broad and stimulating contacts in the industry.

Regarding Public Relations: the subject is altogether too broad to allow an extended discussion here. However, suffice it to say that with state and federal agencies not only regulating aeronautical activity, but also constantly establishing new facilities, the aviation industry must be prepared to co-operate with these governmental activities to the fullest possible extent, if it expects to obtain what it wants. Small, occasional, unstudied, and widely varying outcries only heckle these departments. On the other hand, strong, constantly repeated, and obviously honest and intelligent opinions not only help but are even welcome.

As an example of what can be accomplished by a well coordinated program, let me quote from a resolution recently passed by the Western States Governor's Conference, held at Salt Lake City, Utah, on Aug. 27, 1929. This conference was called following the Western States Air Commerce and Airways Conference, held at Boise, Idaho, on July 8-9-10, 1929:

> "Whereas, the Western States Aeronautics Association, comprising representatives of the Governors of the eleven Western States, was organized at Boise, Idaho, July 10, 1929, for the purpose of promoting air commerce in the West and with the following objectives:
>
> "1. Uniformity and flexibility in legislative matters.
>
> "2. Adoption by the States of the regulations promulgated by the U. S. Department of Commerce.
>
> "3. Establishment of State and interstate airways in close coordination with the Federal Airway system, uniform airway markings, reciprocity between States relative to licensing of aircraft, airmen and taxation.
>
> "Now, therefore, be it Resolved that this conference endorse said organization and its purposes, and urge the active support of public officials and those engaged in the industry; and particularly request those states that have not already appointed representatives of said association to take immediate action by making suitable appointments."

Here, then, we find the result of cooperation in the highest degree between state governments, the Aero-

nautics Branch of the Department of Commerce, the Post Office Department, the U. S. Chamber of Commerce, the Army Air Corps, the Bureau of Aeronautics of the Navy, the Aeronautical Chamber of Commerce, the National Aeronautic Association, and the industry at large. What more could one ask? Uniformity, to prevent confusion; flexibility, to forestall irrevocable action. A pretty picture that, and one which harks well for the future prosperity of our industry.

True, the associations enumerated above played a major part in the splendid accomplishment of the Boise Conference; however, some of the most forceful and helpful discussion was advanced by experts loaned to the convention by large concerns. Only the big holding companies could possibly afford to retain competent talent capable of handling such work. Above all, do not confuse this activity with old fashioned "lobbying." Nor does it in any way smack of things monopolistic. In fact, every industry must protect itself against those who might misuse it, either maliciously or through plain misunderstanding. No industry can long remain healthy and robust whose destiny is left entirely in the unmolested hands of those who are assigned to the task of regulation. Competition is the life of trade. There is plenty of it today in aviation, which means that the industry will be honestly, fearlessly, and capably developed for the best interests of the general public.

LAST WE COME to the part mergers play in the elimination of duplicated effort and in the reduction of economic waste. Every manufacturing company must have a general manager, a production superintendent, a sales manager, a purchasing agent, a chief engineer, a chief accountant, and various other highly paid individuals who are strictly "overhead" personnel. These they must have whether they make one or one hundred planes per month. Overhead, in some aircraft plants, has run as high as 200 per cent of direct labor costs. Obviously, this heavy and comparatively fixed burden can be greatly reduced per plane by increasing the number of units manufactured in a given plant. There are many other savings contingent on increased production, but this example will do to bring out the point. For instance, if the production in a factory could be increased tenfold, and "General Overhead" remained the same, then one of the major items of cost would be very greatly decreased per unit.

It must be distinctly understood that no company, however, large or small, could possibly long survive and prosper if an inferior product were constantly foisted on several of its transport subsidiaries by one of the manufacturing units under its control. However, it is almost inconceivable that such a condition could exist in the presence of good management. I believe we may safely assume that an extensive system of consolidated mail, passenger, and express lines, together with flying schools and taxi services, must needs provide the outlet which will allow a manufacturing concern to increase its production, and hence reduce cost. The arguments on both sides are too numerous for citation here, but the fact still remains that consolidation with a capably managed concern invariably means elimination of duplicated effort, increase in demand for a given product, and ultimate reduction in costs to the public, both in transportation service and aeronautical products. This, then, is one of the greatest advantages in merging the interests of several coordinated concerns.

We have now enumerated the most obvious advantages of consolidated or merged aeronautical interests; but what of the objections? There are two interested parties whose opinions and desires we must respect, i.e., the mergees themselves, and the public. What price must either of them pay? Frankly, I can find absolutely nothing in mergers which, as a general statement, can be said to jeopardize the best interests and welfare of either party. There are, of course, exceptions which prove every rule. We must, also, forever contend with sharp dealing and questionable ulterior motives. However, a similar warning applies all through the activities of this busy world of ours; it has no particular significance here.

Local pride in ownership is about the only price the mergee pays; the public, whom the industry aims to serve, pays nothing, yet reaps its share of the reward. That is exactly as it should be.

"The Big Four"

Curtiss-Wright Corporation

Curtiss Aeroplane & Motor Company, Inc.
Curtiss Airports Corporation
Curtiss Flying Service, Inc.
Curtiss Aeroplane Export Corporation
Curtiss-Caproni Corporation
Curtiss-Robertson Airplane Mfg. Co.
Wright Aeronautical Corporation
Keystone Aircraft Corporation
Moth Aircraft Corporation
New York and Suburban Air Lines, Inc.
New York Air Terminals, Inc.

United Aircraft & Transport Company

Boeing Airplane Company
Boeing Air Transport
Stout Air Services, Inc.
Pratt & Whitney Aircraft Corporation
Chance Vought Corporation
Sikorsky Aviation Corporation
Hamilton Metalplane Company
Hamilton Aero Manufacturing Co.
Stearman Aircraft Corporation

The Aviation Corporation

Universal Aviation Corporation
Colonial Airways Corporation
Fairchild Aviation Corporation
Embry-Riddle Aviation Corporation
Roosevelt Field, Inc.
Southern Air Transport, Inc.
Interstate Air Lines, Inc.

The Detroit Aircraft Corporation

Aircraft Development Corporation
Aviation Tool Company
Blackburn Aircraft Corporation
Eastman Aircraft Corporation
Grosse Ile Airport, Inc.
Lockheed Aircraft Corporation
Marine Aircraft Corporation
Parks Air College, Inc.
Ryan Aircraft Corporation

CERTIFIED PERFORMANCE AND Safety Ratings

THE ADVERTISED PERFORMANCE data of the wide variety of commercial aircraft at present offered for sale in the United States is, in general, inaccurate. Landing speeds and roll after landing are usually understated, and top speeds, initial rates of climb, and ceiling are usually overstated. The difficulty as regard landing speeds has been thoroughly analyzed by Elliot G. Reid in an article which appeared in the July 20 issue of AVIATION. In this article it was shown that of 83 airplanes 76 were credited with suspiciously low landing speeds. The situation is little better in regard to other performance characteristics. This unsatisfactory condition may be due to a number of causes:

First: There are very few test pilots in the United States who are competent to quickly, accurately and intelligently run a complete set of performance trials. The performance data on Government aircraft has long been accurately determined, and Government experience has shown that the average expert pilot requires thorough training, usually under the supervision of an aeronautical engineer, before climb, speed, and other performance figures or curves obtained by him, including opinions on stability, controllability, airworthiness and the like, can be considered accurate and of real value. The training period often extends over a period of *six months* of intensive flying, during which time the work of the embryonic test pilot is duplicated and checked in every detail by a test pilot of recognized experience. Recognition and analysis of such characteristics as a tendency to auto-rotate or of catastrophic instability (stable in inverted position) requires, not general flying experience, but experience in test work. Intelligent opinions regarding controllability, stability, maneuverability, vibrations, structure, comfort, suitability for purpose and recommended changes are as much a part of the results of performance testing as is the determination of data.

Second: At present performance trials are run by individual manufacturers over their own courses with their own barographs, stop watches and other instruments in widely separated parts of the country under widely varying conditions. As a rule the test pilot who runs the trials is temporarily or permanently in the employ of the manufacturer concerned and may be more concerned with meeting the manufacturer's wishes and expectations than with obtaining accurate data.

Third: In some instances deliberate distortion of facts is undoubtedly resorted to for advertising value.

Fourth: A general appreciation of the significance of performance data as obtained by trials does not exist. In many instances advertised figures are based on pure calculation or on wind tunnel data.

Fifth: No standard procedure for conducting such trials is in use. Roll after landing, for example, is frequently advertised but rarely is the wind velocity at the time at which this roll was obtained stated. Climbs are often and favorably shown with the airplane "light," and speeds at altitudes are almost never accurately obtained. It is virtually impossible to maintain level flight at altitude without the aid of a statoscope or similar instrument, and it is necessary that the full speed at each specified altitude be maintained for at least, say, five minutes before minor variations are eliminated. In

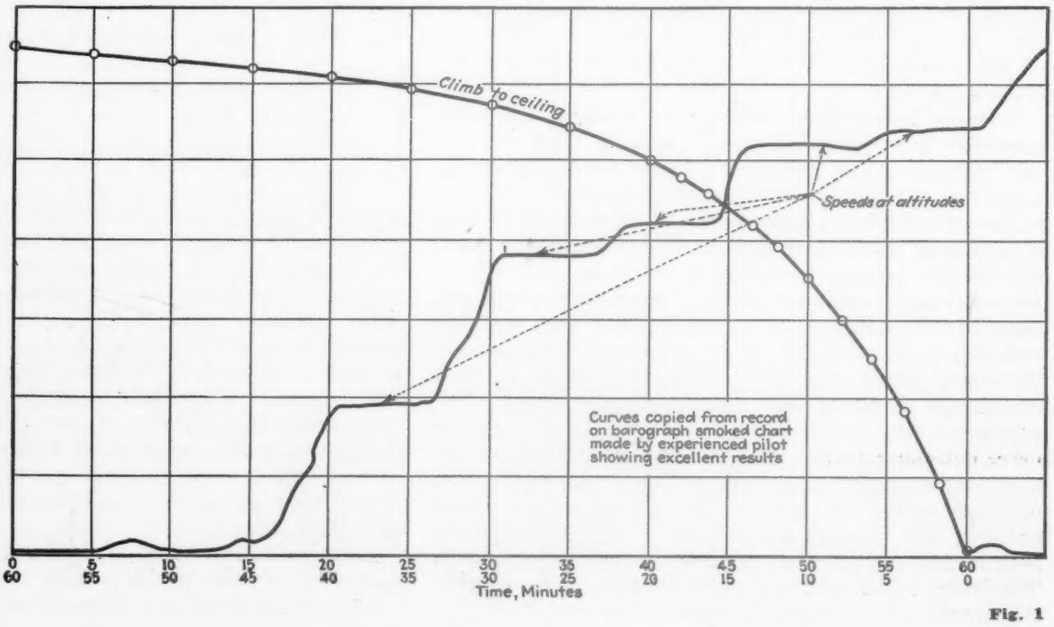


Fig. 1

TRIALS

By Lieut. Comdr. Frank Wead
The Aeronautical Safety Rating Company of America

fairness to the airplane a series of saw-tooth climbs should be run to determine the speed of best climb at three altitudes, and the results should be utilized in running the smooth climb curve to ceiling. It should be unnecessary to point out that for fair comparison with other types and for a true estimate of the value of the airplane, all performance data should be obtained with the airplane loaded to its specified full gross weight, and that the same propeller setting should be used in all tests. Accurate weighing is necessary to determine the center of gravity and tank capacity and the full gross weight should be checked before every test flight. There are several recognized methods of obtaining landing speed, of which, the photogrammetric method is perhaps least subject to error.

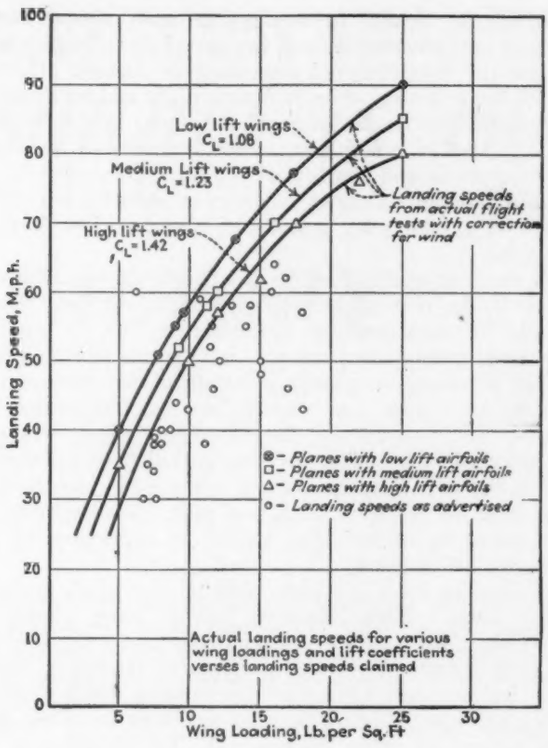


Fig. 3

In each of the various tests that go to make up complete performance trials, a best method exists and should be universally adopted. The conditions under which each test is to be run should be accurately defined in detail, in order that all trials may be run on the same basis, and a standard procedure should be laid out and followed. For example, it is believed that landing speeds, time and distance of take-off and roll after landing without braking should be obtained, for universal fair comparison, under a "no wind" condition, and that the idling r.p.m. of the engine should be noted and recorded. Little or no attempt has been made to standardize endurance trials. It is suggested that the endurance should be obtained in hours and in miles, at (a) full power at 15,000 ft., including climb and (b) at cruising speed at 2,000 ft., including climb, and that the mixture control should be used to greatest advantage in each instance. The full power test represents perhaps the minimum endurance for the type, and the test at cruising speed represents perhaps the maximum under average operating conditions. The average r.p.m., fuel consumption in gallons per hour and oil consumption in pounds per hour, and the average air speed meter reading (corrected) should be recorded. The distance flown should be obtained by multiplying the elapsed time by the average air speed meter reading (corrected) and the cruising speed used should be decided upon after considering the air speed meter calibration curve (air speed vs. r.p.m.) of the airplane and the fuel consumption curve of the engine or engines. There are many very

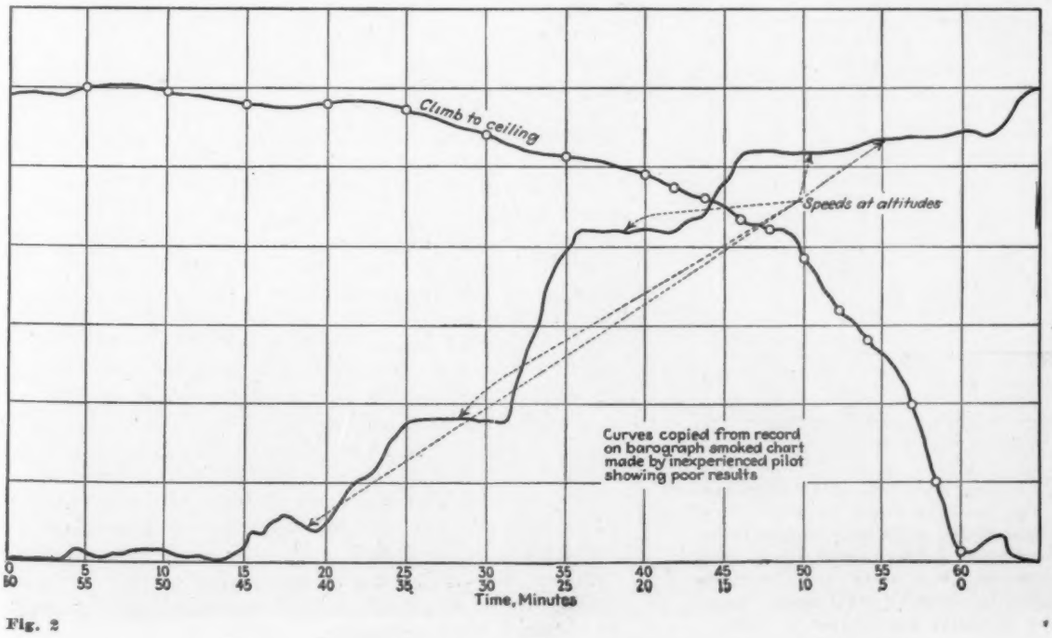


Fig. 2

troublesome details in connection with almost every item of performance testing, neglect of any of which may render the data obtained inaccurate or useless. Printed forms for recording observations in flight and for drawing upsmooth records are of great assistance in this regard. It may also be noted that, in the interests of accuracy, the equipment and comfort of the test pilot is worthy of serious thought. Correct readings at altitudes are rarely made by a pilot who is suffering from cold or lack of oxygen.

If the plan outlined above is adhered to, the final step seems to be that such trials should be run and sworn results be furnished the manufacturer by an outside, unbiased, independent agency, having no axe to grind except the accurate, prompt and faithful determination of performance data and expeditious completion of the trials. Such an agency should employ highly trained, experienced test pilots of recognized ability, should utilize the best instruments and other equipment obtainable, and the work of each test unit, including that of computers and technicians, should be supervised by an aeronautical engineer.

At present there is a great variety of aircraft types in every class. These aircraft, before being placed in production, have passed the requirements of the Department of Commerce. The prospective purchaser, however, has no ready method of determining which of these types are really high class and excellent in every way and which of them barely met the Department of Commerce requirements. It cannot be denied that some of the airplanes flying today have their weak points and that others could be considerably improved in design or

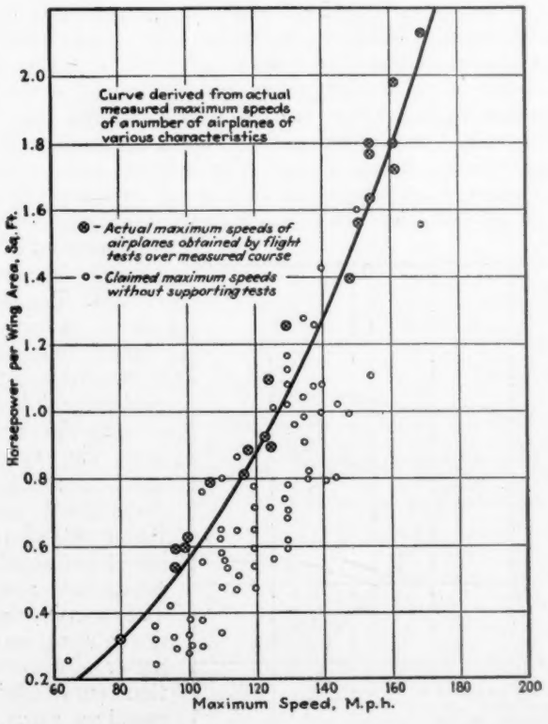


Fig. 4—Comparison Between Maximum Speed Characteristics of Airplanes and Ratio of Power to Wing Area. This ratio can be demonstrated to be the principal factor determining maximum speed. The comparatively close adherence of the major points to a smooth curve contrasts strongly with the irregular slanting in of points representing planes and estimates unsupported by tests.

structure. The Department of Commerce is primarily concerned with passing planes which exceed a prescribed minimum and rejecting those which do not. Safety ratings have been suggested as a means of determining the varying degrees of excellence of aircraft, much as Lloyd's ratings classify steamships.

SUCH RATINGS should be based upon the following studies, analyses, tests or investigations: history of design; detailed specifications of the airplane; aerodynamic characteristics; stress analysis in all flight and landing conditions; static and dynamic tests of materials and assemblies, including sand loading, X-ray analysis of welds, destruction tests of fittings, drop test of chassis, etc.; investigation of loads in flight with interferometer and accelerometer; flight tests to determine stability, maneuverability and controllability; determination of center of gravity with various loadings; safety features; selection of materials, manufacturing facilities, workmanship, supervision and inspection. The standard procedure for determining such ratings should set forth the tests or investigations to be carried out under each of the above headings, including the basis for stress analyses, safety factors deemed necessary, and similar information, and the summary of results should include recommendations tending to improve design or structure and to simplify production. Such a procedure would result in rating the aircraft as a type, and the information gained should be of inestimable value to prospective purchasers, to the manufacturer, and to insurance and finance companies handling aviation work. A fresh competent viewpoint in invariably of value in engineering and production projects.

Some classification is necessary and the following is suggested: A rating of A-1 for the best types, followed in order by the ratings A-2, B-1 and B-2 within the following classes:

Class 1: Single-engine, 3,500 lb. or under
Class 2: multi-engine, 3,500 lb. or under
Class 3: single-engine, 3,500 lb. or over.
Class 4: multi-engine, 3,500 lb. to 7,000 lb.
Class 5: multi-engine, 7,000 lb. or over.

When an aircraft has been rated as a type, or performance data has been certified; a monthly affidavit from the manufacturer would insure that the features of the type are not altered during production, or, if changes are made, additional tests would be run to determine whether certified performance data or the safety rating should or should not remain effective.

Individual aircraft could be rated, after the investigations leading to a type rating are complete, by the maintenance of inspectors who work for the rating organization, at the manufacturer's plant, who would thus insure that the standards of a safety rating are met on each and every airplane of the production program. Such individual aircraft safety ratings should not be effective for, say, more than three months. At the end of each three months period the airplane should be inspected in service and the rating plate, if the aircraft has been maintained in satisfactory condition, should be renewed for another three months period or cancelled.

Any plan such as that outlined above will rest entirely upon the integrity of the organization executing it. Laboratory, wind tunnel, and other research and tests, analyses and trials must be thoroughly carried out, and the opinions of consultants of recognized ability must be obtained when necessary.

HANDLING *Personnel* IN THE AIRCRAFT FACTORY

By ELWOOD D. ULLMAN, JR.

HOW TO HANDLE the hundreds of job-seekers who beseige the airplane factory each week, how to secure the best-suited workers for the vacancies that arise, and how to keep the employees in a happy, enthusiastic frame of mind so as to insure the most efficient production are among the many important problems confronting executives of the present-day airplane factory. Methods used by the Ryan Aircraft Corporation, St. Louis, makers of the six-place Ryan Brougham, have proved highly successful, and its employees are noteworthy for their high morale as well as their skill.

The plant is about a year old, production having been started last January. It is located in the northwest portion of Lambert-St. Louis Field, site of the Municipal Airport, and consists of three buildings. There is a main factory building with dimensions of 280x75 ft., a smaller assembly plant, measuring 120x75 ft.; and a two-story office building between them with dimensions of 50x50 ft.

At the time this article was prepared, the personnel of the Ryan company totaled 172, of which 147 were in the factory. The number of employees is increasing as a result of accelerated production. The factory personnel, by departments, was: metal workers, 15; welders, 27; sheet-metal workers, 16; wood workers, 29; painters, 4; workers in covering and doping department, 14; upholsterers, 4; and assemblymen, 26. Apprentices, helpers and unskilled labor receive an approximate hourly wage of 50 cents. Skilled workers, such as welders, metal workers, wood workers, etc., average about 75 cents; and others with much experience and unusual ability are paid around $1.

Included in the factory is a group of eight girls employed in the wing and fuselage covering department. The work does not demand the services of a skilled mechanic and, in fact, officials have found that girls are more adept at it than men. Most of them have received

Final assembly line at the Ryan Aircraft factory in St. Louis

experience in handling dress patterns and power sewing machines so that they may be readily trained to apply their knowledge to airplane requirements.

UPON Albert G. Tindale, the factory superintendent, devolves the task of solving the employment problem. As any airplane manufacturer will aver, it is no small problem. There are so many applicants for work that Mr. Tindale could devote all of his time to interviewing them and answering their letters. However, he has worked out an effective plan to cope with the situation.

All comers entering the main office are confronted by a young lady who asks their business and directs them to the proper official. This young lady is not only an information clerk but, in effect, an assistant employment manager. Job-seekers are handed a printed application blank and directed to fill it out at a nearby table.

As a general rule, the applicant leaves after he has filled out his blank and deposited it with the young lady. He is told that he will be notified should his services be required. However, if there are any vacancies, the young lady will detain any likely-appearing men who seem well qualified to fill the openings. These applicants are interviewed by Mr. Tindale and if a man is deemed acceptable, he is instructed when to report for work. Instructions concerning any vacancies are given the young lady by Mr. Tindale each morning.

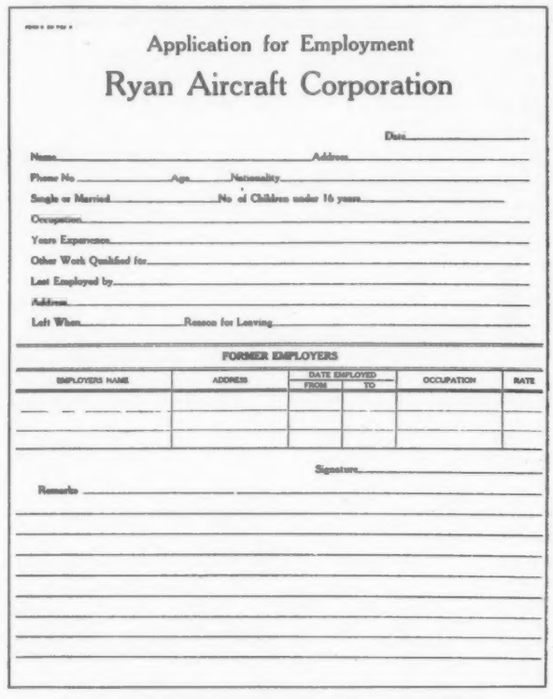
Experience in dealing with job-seekers enables the young lady to weed out ill-suited workers from the others so that Mr. Tindale does not have to waste any time with the obviously unqualified. The young lady goes still further: she detains any extremely well-qualified workers for examination by Mr. Tindale even though there are no vacancies in the applicant's particular occupation. This is done to enable the firm to engage or "get a line" on valuable men. In case the applicant is unusually promising and there are no vacancies, room is made for him.

The application blanks are turned in to Mr. Tindale daily. He goes over them, selecting the most interesting. Records from these blanks are transferred to cards which are kept in a box on his desk. These cards are assorted and arranged according to occupation so that they may be quickly referred to in the event a need arises. They are even graded "good," "fair," etc., so that the most likely applicant can be given first call.

Sometimes a man will be given a practical test to aid in grading his application card. A welder, for instance, will be asked to step back into the shop, take a torch and do a small piece of work. The foreman reports to Mr. Tindale concerning the ability shown and the proper notation is made on the card.

Cards are not made out for all application blanks as many of the latter plainly show that the would-be employee has no place in an airplane factory. All letters requesting work are answered by a polite form letter regretting the lack of an opening and stating that the applicant's name has been placed on file. In case the letter is from a man of unusually high caliber, an experienced superintendent or an executive, he will be personally answered by Mr. Tindale.

As soon as a man is engaged, his application card is transferred to another box which contains the records of active employees. Here the cards are arranged according



Application for Employment

Ryan Aircraft Corporation

Date

Name Address

Phone No Age Nationality

Single or Married No of Children under 16 years

Occupation

Years Experience

Other Work Qualified for

Last Employed by

Address

Left When Reason for Leaving

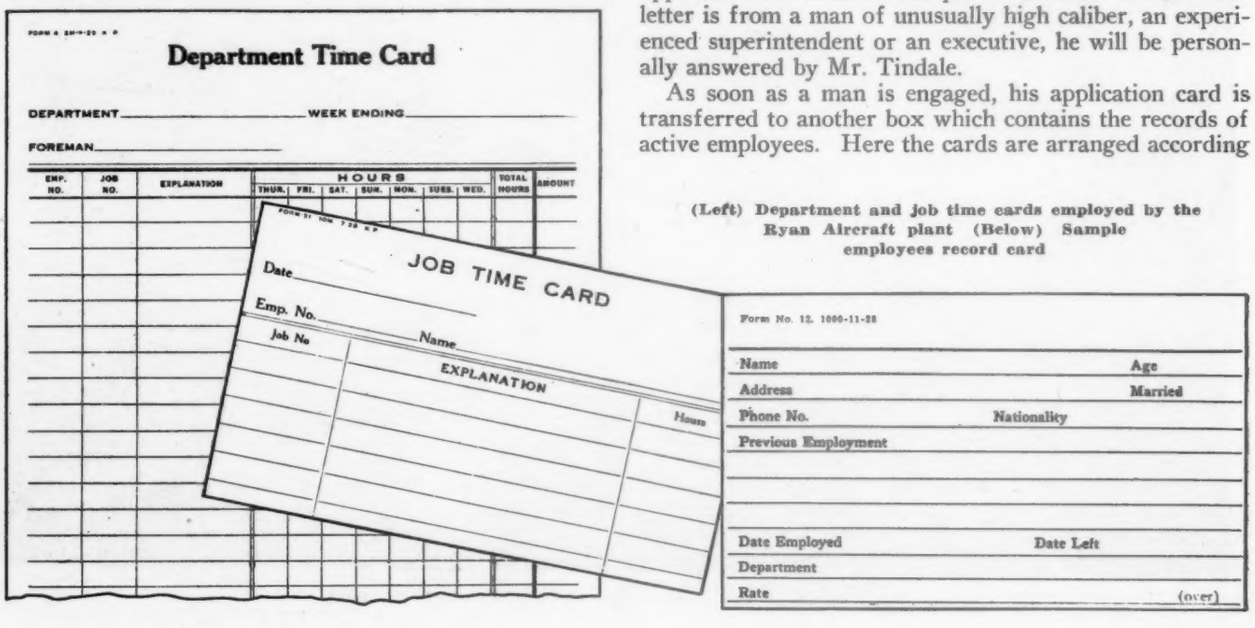
FORMER EMPLOYERS

EMPLOYERS NAME	ADDRESS	DATE EMPLOYED FROM	DATE EMPLOYED TO	OCCUPATION	RATE

Signature

Remarks

Employees application form used by the Ryan Aircraft plant



Department Time Card

DEPARTMENT WEEK ENDING

FOREMAN

EMP. NO.	JOB NO.	EXPLANATION	HOURS THUR.	FRI.	SAT.	SUN.	MON.	TUES.	WED.	TOTAL HOURS	AMOUNT

JOB TIME CARD

Date

Emp. No. Name

Job No	EXPLANATION	Hours

Form No. 12. 1000-11-28

Name Age

Address Married

Phone No. Nationality

Previous Employment

Date Employed Date Left

Department

Rate (over)

(Left) Department and job time cards employed by the Ryan Aircraft plant (Below) Sample employees record card

Corner of the welding department of the Ryan Aircraft St. Louis plant

to departments in the plant. The front of the card contains space for the following information: name, address, age, married or single, phone number, previous employment, date employed (at Ryan), department, rate of pay and date left. The back is spaced to show the employee's progress according to departments and increases in wages. Thus, the same card may be used in the application box and the active employees' box.

Mr. Tindale has adopted a definite attitude with respect to graduates of mechanics' and other ground courses in aviation or trade schools. He gives these men preference for unskilled work—jobs as apprentices or helpers—but does not prefer them for skilled labor unless they have received practical experience in addition to what was obtained at school. Generally speaking, a mechanic who has had practical experience as well as school training will be preferred over a mechanic with the same amount of experience but no school training.

As a general rule, new employees are not started out on the less important jobs until they have satisfactorily demonstrated their ability. There is no piece-work and no bonuses are paid. The men are paid at the regular scale for overtime, nothing extra being allowed, and receive their wages during illness. All promotions come from within the ranks as far as is possible in order to give employees a definite objective in working.

The employees put in 46½ hours a week, working five and a half days. Hours are from 8 a.m. to 5 p.m., with a half-hour off for lunch, and from 8 to 12 on Saturday. The time-clock is punched on arrival at and departure from the plant but is not punched on leaving for and returning from lunch.

There are about six factory foremen, some of them having jurisdiction over one department and some over several. Periodic conferences are held between the foremen and Mr. Tindale to insure the smooth working of the various departmental units—and discuss pertinent matters.

A DOUBLE-CHECK is kept on pay records. In addition to the time-clock card, each employee has a daily job-time card to keep track of the number of jobs worked on, explanations of them and hours involved. These cards, or slips, are turned in each day to the foreman, who, in turn, computes a departmental time card for all workers under his supervision. The departmental time card is turned in once a week. It lists the number of each employee together with the number of his jobs worked on and the time consumed on them as well as the total number of hours and the amount due. This departmental time card is compared with the time-clock card and, in the event of a discrepancy, a conference is held to iron the matter out. The week ends Wednesday and employees are paid by check on Saturday.

In order to maintain an orderly appearance about the plant, employees are required to wear a uniform overall bearing the word "Ryan" on the back. These overalls are purchased in large lots at low prices by the company and are sold to the employees at cost. Soiled overalls are picked up once a week by a laundry, the employees paying for the washing. Personal articles of apparel and belongings are kept in lockers, the company providing an individual steel locker for every worker. They are located in the lavatory rooms. The company furnishes all large tools, but the smaller, every-day tools are supplied by the mechanics, each of whom has his own kit.

A registered nurse is kept on the premises at all times to treat injuries. A small dispensary with the nurse in charge is located in the office building and employees may report there for free treatment. The nurse's hours are from 8 a.m. to 5 p.m. In the event of a serious injury, the field physician or a physician in Ferguson, Mo., can be summoned in a few minutes. As a rule, all cases requiring more than minor treatment—and these are few—are sent to a physician's office in St. Louis. An automobile belonging to some company official is

Ryan Aircraft purchasing and production record office, where all matters concerning these two departments are administered

commandeered for this purpose, no ambulance being maintained on the premises. According to the nurse's records for an 11-month period ending August 12, 99 cases were treated at the dispensary. Most of them were slight injuries and it was necessary to send but 18 of the patients to the physician's office in St. Louis.

In addition to the factory workers enumerated above, the plant also employs one chauffeur, two watchmen, four storeroom clerks, one shop maintenance man and four factory janitors. There are five engineers, two superintendents and one test pilot. The sales and advertising department has a personnel of five and the administrative department, twelve.

THE BENEFITS OF A Finance Service

WHEN THE NEWS SERVICES of the Nation flashed forth the word that the first organization had been formed to finance aircraft installment sales in much the same way that General Motors Acceptance Corporation and other national companies finance automobile "paper," telephone calls, wires, letters and personal visits very quickly indicated that a substantial demand existed for just such a company.

The fact, however, that in aircraft financing there were additional ramifications, including financing of the manufacturer, distributor, dealer, pilot-purchaser and even, under proper circumstances, inventors and patentees, brought forth a host of inquiries as to "how it works."

At the request of AVIATION, we will outline the function of a complete financial service as it affects various branches of the flying business, taking them in single steps, from the manufacturer on down.

Let us assume, then, that there exists such an organization as the Blank Aircraft Company, building a plane that sells for $15,000; that its plane is of an approved type, powered with an approved engine, and, therefore, insurable. That is the only kind of airplane that can be financed at present, in any stage of the transaction, because protection against loss of the deferred payments is essential to the sound conduct of any financial institution.

The Blank Aircraft Company receives a contract from a large transportation company for six of its planes, a total cost of $90,000. Other contracts are on hand. The company can use borrowed capital; in fact, it *needs* such capital, because it cannot collect until delivery is made. Under such circumstances the manufacturer could make application for a very generous share of what the planes cost him to produce; possibly he could secure *all* the funds he needed for such a purpose, assuming that the financial stability of the buyer and the value of the contract were definitely fixed as worthy.

The collateral in such a loan is in an assignment of the finished planes to the lending corporation, plus the bills of lading for ultimate collection.

INASMUCH AS most airplane manufacturers do not make their own engines, and because engines cost considerable money, their might not infrequently occur some such situation as this:

Jones builds engines which he sells to manufacturers for $1500. The Blank Aircraft Company contracts for 1,000 of them, an aggregate cost of $1,500,000. Both aircraft and engine builder bond themselves; the one to deliver within a specified time, in satisfactory condition; the other to pay upon acceptance.

The builder of the engines wants $750,000, so he can proceed. He could borrow that, on the same basis as the hypothetical plane builder in the case outlined above. The collateral would amount to the same thing. Only, in this case, upon delivery of the finished engines, the lending corporation might say to the aircraft builder, putting it freely. . . .

"There is no necessity for you to pay cash for these engines. We will pay for them, and you now owe us $1,500,000, plus charges. You use your money for building airplanes."

Throughout the life of the loan to the engine builder there is a likelihood that technical experts of the finance corporation would contact the plant and see that requirements were met and specifications rigidly adhered to. Managerial skill might be introduced, if conditions called for it.

NOW WE ARE BACK to the Blank Aircraft Company again. They have used the 1,000 engines and built 1,000 airplanes, and now they wish to sell them. Some have been absorbed on contract purchases, others must go to distributors.

In the past it has been necessary for the distributor to pay cash even for flooring planes for display purposes. If the manufacturer could only make it possible for him to make his money go further, he would be able to show a more representative line. Here, then, is how aircraft financing renders a further service to the manufacturer. It provides him with his best selling argument, because he can offer the distributor four to five times as great a buying power for a given amount of money.

"Pay me only 20 per cent of the wholesale cost," he tells the distributor. "My financing company will handle the other 80 per cent."

Of course, in such cases the planes are understood to be for display purposes only, and are not to be demonstrated, nor flown. Charges for such a service are most reasonable.

But we are getting into the distributor and dealer problems, and they had best be reserved for later.

Within the same province as the manufacturer might be said to be the patentee and inventor. His problems justifiably fall within that boundary because, after all, what he aspires to become is a manufacturer. There is a distinct place for the financing corporation in this sphere, also.

The patentee, instead of wandering from pillar to post

TO AVIATION

By A. O. HUNSAKER
President, Aircraft Finance Corporation of America

attempting to interest someone in his patent, can visit the financing corporation's technical staff and very quickly win assurance of financial assistance, if what he has patented or invented is a practical and marketable article.

Thus he is saved time, energy and money; the necessity of forming, or becoming part of a separate company; creating a selling organization to raise money; finding markets, etc. The financing company, if it accepts his problems, does the organization and promotion work through its own staff, and its compensation is an interest in the business. In some cases it might entirely, or largely, underwrite such a business. The chief difference here between how a financing corporation would handle such a case, and how it ordinarily would be handled, is simply this: the product must stand up under the test of technical experts before anything will be done, whereas unscrupulous promoters might accept any kind of a "gadget" as a foundation for a securities issue.

And now, regarding the distributor and dealer.

Engaged in the business of merchandising very high-priced units, his position might be said to be analagous to that of a Cadillac, Lincoln or Rolls-Royce distributor and dealer who has to pay cash to floor his cars. One can imagine how sparse the display rooms on Automobile Row would look if such were actually the case. And one can understand, at the same time, why most distributors and dealers of airplanes show such an unrepresentative line of whatever craft they happen to represent.

THE BUSINESS of financing the distributor and dealer in the aviation world is just as important, if not more so, than the parallel, and at the same time profitable, business of financing the automobile men. A very acceptable plan has been worked out in behalf of these "middlemen."

Inasmuch as the financing process is largely a link between manufacturer, distributor, dealer and final purchaser, the "approach" to the distributor and dealer is generally through the manufacturer whose products he represents. However, that is not vital; the distributor can act for himself directly, if he chooses. In either event, the machinery is the same.

Various agreements affect the working arrangement, as between the finance company and the manufacturer; as between the finance company and the distributor; as between manufacturer and distributor, and so on. But it all simmers down to this:

John Jones has the distributorship in a given territory of a certain manufacturer's airplanes. Various models are produced, but Jones cannot afford to keep more than two on hand, because he must pay cash, and lacks the funds necessary to place a complete stock on his floors.

Through financing arrangements he can spread his cash five times further than it ordinarily would go, for only 20 per cent is required for a 90-day flooring at a straight legal rate of interest, plus a very small fixed charge for book-keeping. With $20,000, therefore, Jones can keep on hand about $100,000 worth of stock.

The first requirement, naturally, is the establishment of a wholesale line of credit by the distributor or dealer. A financial statement must be filed. Assuming the granting of the credit, the business then proceeds under the laws of the state in which operations are being carried on—either under conditional sales contract, or chattel mortgage form.

The three months' flooring privilege may be extended an additional period of time, upon request, and the down payment of the distributor covers extras, freight, handling, decking, advances, etc. Interest charges cover, in addition to interest, conversion coverage, bank fees and exchange charges.

Obviously, it is not necessary, in the case of the dealer and the distributor, to cover with insurance the many risks that would be included were the craft to be used in demonstrations. For display purposes only, fire insurance is sufficient, but it is understood that the dealer or distributor will not take the plane off the ground during the life of his contract, or loan, without imme-

diately and in advance, notifying the financing corporation.

If the manufacturer can extend credit terms to the distributor, the distributor can extend them to the dealer. By the same token, the dealer can carry the hypothecation on another step to the pilot purchasing the plane.

The veriest layman can appreciate what such a service will mean to the progress of aviation. Manufacturers can rest assured of a greater absorption power through distributors and dealers, and the psychological effect of many airplanes on display, instead of the usual single plane, will be a mighty influence in creating sales.

There have been a good many arguments during the past few years as to the wisdom of installment purchasing; of contracting to pay for something in the future that cannot be paid for out of pocket today. But the super-prosperity of America would seem to belie the alleged dangers of buying on such a basis. Economists may argue that this is a land rich in natural resources and would be prosperous, anyway. They may argue that we are a naturally energetic, go-getting nation, or that the war debts of other nations are piling up gold on our shores.

But the fact remains that other nations are energetic; that others have great natural resources; that others have enormous collections coming in from debtor nations. About the only factor not common to some, or all, is installment buying, developed to its ultimate only in the United States.

Here are 26,000,000 automobiles, against paltry thousands in other lands; here our women are released from bondage by washing machines, vacuum cleaners, and electric refrigerators bought on the "dollar down" basis, and entertained by radios purchased the same way. Luxuries remain luxuries where installment purchasing is not the rule, and become part of our daily lives, where they are.

In other words, everything is capital, and we own more when we can pay for it gradually, than we would ever own if we had to pay for it all at once.

THE PURCHASE OF AIRPLANES for purely sports purposes is now reaching greater and greater proportions. Most of the sports flyers want good planes. They appreciate that as business or professional men they are not in a position to keep as thoroughly in practice as regular flying pilots, and they like to know that the machine they are flying is right. But for every one that can pay $10,000 cash for such a plane, there are thousands that can pay $3,300 in cash, and the balance over a period of time.

Must we hold back producers until these men have accumulated the cash, and must we keep these men from developing a broader flying spirit? Finance corporations are organized to make it possible for the manufacturer to build more planes with surety of sale; for the dealer and distributor to stock more planes with a given amount of money; for the ultimate pilot-purchaser to buy on terms. And such a service, perfected here in the United States, will go far toward putting aircraft in our skies, and making this nation the most air-minded in the world, and the best protected in an emergency.

It has only been within a comparatively recent period that financing of this type was possible. Insurance rates had to be worked out on a basis that did not make for prohibitive costs; there had to be some official recognition of lien rights so that both buyer and seller would know just where they stood in the transaction. But this is an adaptable country, and both those obstacles have been wholly or partially cleared away.

When a man buys an airplane, now, on the installment basis, the financing company rendering a service which makes such purchase possible, is protected against loss on deferred payments not only through prior lien on the purchased plane, but also by crash, fire, windstorm, tornado, confiscation, embezzlement and theft insurance of a single interest type. And the cost is financed right along with the craft.

That cost is no longer prohibitive. It can be as low as 6½ per cent of the deferred balance. A $9,000 plane, for instance, on which the buyer had paid down $3,000, could be insured in favor of the financing company for approximately $390, including the risks outlined above.

BUT SPORT FLYING is only one aspect of aviation, only one point in the picture where installment buying will make it easier for purchasers. There are commercially trained pilots to be considered, men desirous, possibly, of inaugurating short-run hauls in territory not now served by regular schedules. There are the transportation companies themselves who might want to add to their equipment without having to turn to cash capital on hand which might be required for other immediate needs—a sort of equipment-trust service. Aerial photo services; orchard dusters; private instructors; schools—these and many others need financial assistance at one time or another.

Then there is another side to aircraft financing beside that of the manufacturer, distributor, dealer and pilot-purchaser, although these are naturally the most important. Aviation has many ramifications which call for high-unit outlays of cash. The buying of properties for airports; the installment purchase of engines to replace worn-out power plants; financing repair jobs on several planes at a time, the cost of handling of which might be beyond the immediate means of the repair shop; and the underwriting of installment paper in connection with aviation supply house sales. These are but a suggestion of what such a service can be, and how broad its scope.

Probably few men in aviation are not aware of the fact that the Aeronautical Chamber of Commerce, sitting in with the Aeronautics Branch of the Department of Commerce, and with finance and insurance experts, has worked out a plan notable for its commonsense for application to installment purchases of aircraft. That plan makes it no longer compulsory for the pilot to show a bill of ownership; it may be ownership subject to lien. It also removes from the financing corporation, culpability for the acts of the pilot. And there can be no influx of foreign capital to set up dummy companies for gaining control through other than registered domestic concerns. That is sound protection for both the buyer and the seller.

Whereas a pilot used to be unable to have his plane registered in his name, or licensed on his behalf, unless he owned the plane outright, he now may obtain such registration with the Department of Commerce, with the sole exception that "Subject to Lien" is rubberstamped across the face of the license card.

So one need wait no longer to buy an airplane. All that is required is a small down payment. The balance may be paid over a period of six months, ten months, or even a year. The finance company is ready to make all the arrangements. The present rates of interest are reasonable; insurance is no longer a bugaboo looming large in dollars.

High Speed AS A SAFETY FACTOR IN THE AIRPLANE

By J. Don Alexander
President, Alexander Aircraft Co.

FEW PEOPLE realize the advantages of airplane speed from a safety as well as an economy standpoint. Providing no large sacrifice is made in landing speed, structural strength or maneuverability, the fastest plane is the safest plane. It spends little time over rough terrain on a long cross country flight, minimizing the possibilities of a difficult landing in event of motor trouble. Less time is spent in the air, a fact mitigating against the menace of storms. On a 1,200-mile flight across country an airman may count on hitting a bit of rough weather. If a faster plane encompasses the same distance in half the time, its pilot runs half the risk of battling the elements. He may dodge around storms easily and reach his destination, whereas the pilot of the slow plane, confronted by dark thunderheads, would probably land and call it a day. In his case the delay of the detour made further flight impractical.

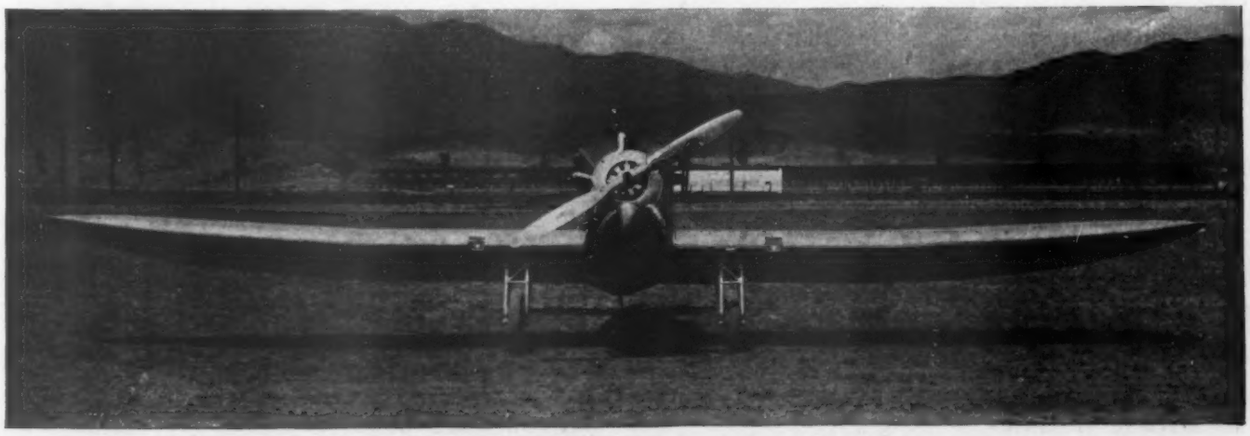
The faster an airplane per horsepower, the more economical it is to buy and operate. A plane with low drag and resistance, and consequently speedy, does not require an expensive, high powered engine in order to reach a high top speed. A light, economical engine, costing far less to buy and run, will suffice. Consequently the "low drag" type of plane is certainly the more economical.

The carefully streamlined plane with little or no exposed parts slips through the air like a barracuda through the sea and requires little horsepower to maintain a fast cruising speed. Unless the pilot is in an unusual hurry, he may throttle down his engine and save gasoline as well as wear and depreciation on his engine.

Excess speed in an automobile is no indication of economy. In an airplane it is. The faster an airplane per horsepower of its engine, the less costly it is to fly. Not only does the faster plane save the time of its passengers, but it covers more ground at less fuel costs and less depreciation on the engine.

GREATER SPEED per engine horsepower is gained only by reducing drag or parasitic resistance and by reducing weight. These are the limiting factors to an airplane's speed. As the speed increases, the drag and resistance increases. Achieve the impossible and eliminate all drag and resistance, and there would be no limit to the speed of a plane. Under the circumstances the best we can do is to minimize these factors as much as possible.

The chief advantage of the light, low powered engine, of course, lies in its low initial cost and low cost of



The Alexander "Bullet," low wing monoplane, with retractable landing gear

operating and maintaining. Depreciation in service cuts a far smaller hole in the operator's purse than with a high powered, expensive motor.

The low powered, light engines burn less gasoline and oil. As aviation fuels are of necessity finer in quality and higher in price than automobile fuels, this economy is welcomed by the average operator.

To cover a given distance, a speedy plane with light engine need carry less gasoline, because the engine burns less gallons per hour. Therefore weight of gasoline does not cut so deeply into the payload of the plane. If an airplane requires 25 less gallons of gasoline to make a long hop, it saves the weight of an additional passenger.

The lighter engine cuts down engine weight, as well as the weight of gasoline and oil tanks, thereby making for a lighter plane, able to get off the ground faster and land more slowly—a safe plane for small fields.

Returning to the safety factor, it may be said that the airplane with clean lines and a minimum of drag and resistance is more safe than a high-drag plane in another respect, which heretofore has received scant attention. The low drag plane will glide farther with a dead engine from a given height than will its high drag contemporary. Excess speed is not needed to overcome the drag on exposed parts. Therefore the plane need not be nosed down so steeply.

ON A LONG cross country trip the fast plane naturally spends less time in the air than a slow one. The motor is operating less time than if mounted in a slow plane. Therefore there is less chance of engine trouble. Sticking valves, "mag" grief, or fouled plugs are far less likely to develop in a fast plane on an extremely long hop. In this respect speed spells added safety in no uncertain terms.

Long flights in rough air are tiring to any but an old, seasoned pilot. The shorter the hop, the better the condition of the pilot as he nears his destination. The fast plane pilot will feel less tired because of a speedy trip. He will use better judgment in approaching and landing on a field than if he had struggled for hours to keep a slow, unweildy plane on its course.

The steady drone of the engine on extended hops make some pilots drowsy. After a short, fast flight the pilot is in better shape to make a good landing if forced down in tricky winds or squally weather. The shorter trip is much more enjoyable to the passengers.

A fast plane will usually "take the bumps" better than a slow one. It passes faster through the area of turbulence than does a slow plane and consequently is not so affected. Compare the smooth riding speed boat to the tossing of a rowboat on the same lake surface. The superior stability of the speed boat lies in the inertia of its speed.

A fast plane has more quick zoom than a slow one. Consequently it can be flown more safely at low altitudes under a low ceiling. If a hill or some other high obstruction appears, the plane can be climbed rapidly so as to pass over it. Sometimes the pilot of a slow plane must do some fast maneuvering in order to avoid a church steeple or tall trees that come looming out of the fog. He loses much time gaining altitude for fences and telegraph wires. Such a condition is extraordinary, of course, but it is not unusual for a pilot who is doing a great deal of flying in bad country to be forced down near the ground by fog before he can find a suitable field on which to sit down.

Flying near the ground, a fast plane has the advantage of reserve speed. If the engine cuts out suddenly, its reserve speed can be used in extending the gliding range. Fields can be reached that a slow, high-drag plane would undershoot.

A good angle and rate of climb is characteristic of all fast planes. One can take off in a deep valley and quickly clear the "hump." Popping out of a cloud, a pilot finding himself about to cross a stretch of bad country or a big city can open up his engine and quickly climb to a safe altitude, from which he can glide, if necessary, to a clearing.

IN THE comparatively heavy traffic around some modern airports I would prefer to be flying a fast plane than a slow one. My "Bullet" could change direction rapidly, make a quick climbing turn or a wingover, in order to avoid colliding with another plane. A slower plane might not prove so maneuverable.

New designs are correcting the old belief that a fast plane of necessity must be a fast lander. One way of overcoming this difficulty is the use of a low wing which takes advantage of the ground effect and cushions the wings as the plane is leveled off near the ground. The ground cushion slows a plane fifteen or more miles an hour.

Improved light-weight designs will also make possible smaller wing loading, materially decreasing landing speeds. For instance a low wing plane does not require as heavy or as strong a fuselage as a high wing plane, because the latter type must have a fuselage strong enough to bear a heavy wing. In the low wing plane the center wing section can serve the added purpose of absorbing heavy torsional strains of a one wheel landing. In high wing types provision is made for this stress by making the fuselage heavier.

It is frequently said that a barn door could be flown around the world, if it were equipped with an engine of sufficient power and lightness. Quite true. But who wishes to fly a "barn door" type of plane?

The faster its wings pass through the air, the greater lift is created and the greater load an airplane can sustain. A fast plane, one with small resistance and drag, consequently requires little wing area to carry its load. Less wing area means less weight and less resistance and drag, automatically increasing the payload and speed of the plane. Fast racing planes, because of their speed, require very little wing area.

The next general step forward in aircraft design, I am confident, will be a widespread adoption of the retractable landing gear on light land planes. Speed tests carefully tabulated over a closed course show that the retractable gear on the Alexander Bullet low wing cabin monoplane added 18 m.p.h. to its top speed. The retractable gear, in other words, as a source of speed was equivalent to 85 more horsepower. Our experience has shown that a retractable landing gear can be perfected so that it will snap down under all kinds of adverse conditions.

In their quest for speed engineers as a class have placed undue faith in streamlining exposed parts with faring. Merely a half-cure and a source of additional weight. The engineers are striving for greater airplane efficiency. More power and bigger airplanes used to be the answer. Today the more enlightened engineers are producing more efficient airfoils and are creating refined, clean designs which do not sacrifice so much expensive horsepower and weight to unnecessary resistance and drag.

GENERAL NEWS

HERBERT F. POWELL, *News Editor*

Safe Aircraft Contest Dwindles to Four Planes

MITCHEL FIELD (L. I., N. Y.)—Only four planes—the Handley Page, Curtiss, Ford-Leigh, and Cunningham-Hall entries—now remain in the Guggenheim Safe Aircraft Competition, with a fifth, the J. S. McDonnell, Jr., plane a possible competitor if it is returned ready for tests on or before Dec. 23.

Four planes were recently counted out of the contest. These were the Bourden and Taylor Brothers craft that were withdrawn; the V. J. Burnelli plane which failed to be returned from Keyport, N. J., on the deadline date, Nov. 30, and the Schroeder-Wentworth entry, withdrawn following its crash Nov. 21.

A special arrangement was made in the case of the J. S. McDonnell, Jr., entry. This plane crashed in a prequalification flight Nov. 22, damaging propeller, one wheel, and one wing. Officials informed McDonnell that the plane might yet enter the contest if it were presented ready for tests on or before Dec. 23 if the competition was still in progress at the time it returned. It was stipulated, however, that this entry would only be eligible for one of the $10,000 prizes.

Of the four entries remaining, the Handley Page and Curtiss craft have passed numerous of the tests, while the Ford-Leigh and Cunningham-Hall planes have just entered the lists for initial trials.

The furor lately begun over the question of rights of the entrants to use the slotted wing has somewhat subsided, court action being a possibility in 1930. The tiff arose when Handley Page stated Curtiss infringed patents in using slots, with Curtiss refuting this charge and declaring the British entry infringed various of their own patents and Alfred Leigh stating his own slot was originally copied by Handley Page. The Guggenheim Fund has stood aloof from the controversy.

Graf to Use Tide Water Oil

NEW YORK (N. Y.)—A contract signed aboard the Graf Zeppelin during a flight over Switzerland, calls for the Tide Water Oil Company to furnish oil for that craft during the next year, according to E. L. Shea, vice-president of the concern. The agreement was effected by the oil firm's German representative, Amerikansche Mineralol, g.m. b.h. The letter, telling of the transaction, requested the Tide Water concern to have supplies of Veedol at Tromsoe, Hammerfest, Norway, and Fairbanks, Alaska, in preparation for the Graf's forthcoming polar flight.

"Wasp Junior" Power Plant Offered by Pratt & Whitney

Is 300 Hp. Engine Using Many Parts From Parent

HARTFORD (CONN.)—Now comes the "Wasp Junior."

Newly developed and extensively tested, the power plant to bear this name is soon to be put on the market, according to Frederick B. Rentschler, president of the Pratt & Whitney Aircraft Company, this city. The entrance of the power plant firm into the 300 hp. field marks a departure from the policy followed by Pratt & Whitney since its inception four years ago, for the concern has thus far devoted all its energies to the production of high powered engines.

According to Mr. Rentschler's announcement, the "Junior" embodies all of the features of the Wasp and Hornet; and by standardization of design, 80 per cent of the parts are interchangeable, even the mounting dimensions being identical.

Essentially, the "Junior" is the Wasp plant with a new power section. The new engine is rated at 300 hp. at 2,000 r.p.m. and weighs 550 lb. as compared with the Wasp of 775 lb. It is 45¾ in. overall in diameter, has an equal bore and stroke of 5⅛ in., and is of 985 cu.in. displacement.

Many of the difficulties usually encountered in bringing out a new model were not met, Mr. Rentschler said, because, of the employment of the many already-proven Wasp parts. Use of the standard rear crankcase section enabled

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Sky Leap Lands Santa Claus in River

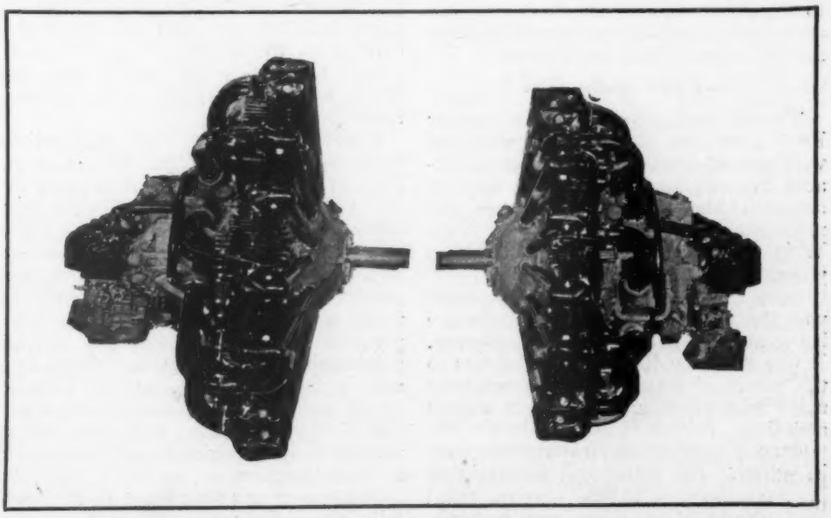
WILKES-BARRE (PA.)—When Santa Claus essayed a parachute jump from an airplane here the other day, he had planned to land in Kirby Park. Instead, he landed in the Susquehanna River and hundreds of children on hand to greet him, held their breaths.

But Mounted Patrolman Joe Jones drove his horse into the river and dragged the bewhiskered, red-clothed jolly old fellow out, with only a good wetting to forget about. Cheers went up from the children.

Some say it was John Riterbaugh, but the children knew it was Santa Claus on his way to visit a local store as advertised.

Pioneer to Use Jewel Bearings

BROOKLYN (N. Y.)—Pioneer Instrument Company air speed indicators are to be manufactured with jewel bearings instead of brass ones which were formerly used. Of the same type employed in watches, these jewels reduce friction, according to the Pioneer organization.



Similarity of the Pratt & Whitney Wasp (left) and the new "Junior" (right) is shown in this side-by-side comparison

Commander Byrd In Flight Over Pole

Ford With Cyclone and Whirlwinds Used

NEW YORK (N. Y.)—"My calculations indicate that we have reached the vicinity of the South Pole, flying high for a survey. The airplane is in good shape, crew all well. Will soon turn north. We can see an almost limitless polar plateau. Our departure from the Pole was at 1:25 p.m."

This message reached the New York *Times* at 8:55 a.m. (New York time) on Saturday morning, Nov. 29, from Comdr. Richard E. Byrd, indicating that he and his three companions had been the first to reach the South Pole by plane.

At 10:10 a. m., Saturday morning, according to later reports to the *Times*, the "Floyd Bennett," the tri-engined Ford plane, landed safely back at its base in Little America, Antarctica, with information and data on new polar regions and accounts of the great difficulties encountered on the 1,600 mi. trip. The journey had taken 18 hr. 59 min.

Had Experienced Crew

Byrd, who flew over the North Pole in 1926 and then conquered the Atlantic the following year, was accompanied by three men, all of whom had records of long flying experience.

Bernt Balchen, who piloted the "Floyd Bennett" most of the way, was with Byrd on the Commander's two previous flights. Harold I. June, successively, machinist, mechanic, pilot and radio operator, was in charge of the wireless apparatus during the flight. The fourth member of the group was Capt. Ashley C. McKinley, photographer, who served overseas during the war as head of the Twelfth Balloon Company.

The "Floyd Bennett," so-named in memory of the aviator who lost his life in 1928 from pneumonia while flying to the aid of the German fliers stranded on Greenley Island, was especially fitted for the South Polar expedition.

Ford Has Special Joints

Though quite similar to the regular Ford transport planes, it is equipped with special joints and other parts suitable to withstand the severe tests of sub-zero temperatures and other climatic conditions around the pole. Two Wright J-5's and a Wright Cyclone, power the machine.

Completed in March, 1928, the craft was put through extensive tests before being shipped to the Antarctic regions. It was flown by Bennett and Balchen to the north of Canada and experiments made with landing gear of both wheels and skis.

Among the various instruments used in piloting the plane and ascertaining bearings, were a bubble sextant, fitted for horizon observation, sun compass, magnetic compass, drift indicator, charts, and watches. The camera used by McKinley in taking photographs for a strip map of the regions, was a regulation United States Army Air Corps machine equipped with a long roll of paper for data insertions, a thermometer, a barograph and a stop-watch.

Carried Byrd, Balchen, June and McKinley Over the South Pole

In negotiating the dangerous route which led over the ice barrier, through a glacier opening in the Queen Maud Range, and on to the pole, it was necessary to dump overboard 280 lb. of food, as Byrd considered the loaded plane might not otherwise be able to clear the peaks. On the return stretch, a stop was made at one of the depots to transfer gas to the tanks and leave supplies and mail for the geological party on foot.

Aviation officials and authorities in commenting on Byrd's flight, said problems faced in winter flying and over uncharted land, would be greatly aided by the results gathered on the South Pole venture. The photographs secured will also be of great value to those attempting trips in that territory.

"Wasp Junior" Engine Offered by P. & W.

(*Concluded from Page* 1119)

the inclusion of the same mounting circle as that of the Wasp thus making possible the production of a plane to carry both 300 and 420 hp. plants according to the desire of the manufacturer. Like the Wasp and Hornet, the Wasp Junior is available with propeller reduction gears.

Rapid progress in the construction work on the new $2,000,000 plant at East Hartford was also announced by Mr. Rentschler. Completion of the new factory Jan. 1 will make available 500,000 sq.ft. thus increasing production facilities 100 per cent. Alongside the new Pratt & Whitney unit, work is under way on the Chance Vought Corporation plant, which will cost in the neighborhood of $1,000,000. When this unit is ready, manufacture of Vought planes will be discontinued at the Long Island City factory and the entire personnel and equipment will be moved to East Hartford.

Statements say that Pratt & Whitney will have manufactured approximately 200 Wasp and Hornet engines a month during the year 1929 as compared with 65 engines a month in 1928. Twelve world records are held by Pratt & Whitney engines in the fields of speed, range, and endurance.

The following are the specifications of the Wasp Junior 300 hp. radial air-cooled engine:

SPECIFICATIONS

Type	Air cooled fixed radial
Number of cylinders	9
Bore	5¼ in.
Stroke	5¼ in.
Displacement	985 cu.in.
Guaranteed power at 2,000 r.p.m.	300 hp.
Weight	550 lb.
Length overall	41⅜ in.
Diameter	45¼ in.
Propeller Hub	Standard S.A.E. No. 30
Fuel Consumption at 300 hp.	.55 lb. per hp. hr. max.
Oil Consumption	.025 lb. per hp. hr. max.

The Pratt and Whitney Aircraft Company is a division of the United Aircraft and Transport Corporation of New York City, of which Mr. Rentschler is also president. Other companies are: Boeing Airplane Company, Boeing Air Transport, Inc., Seattle; Pacific Air Transport, Seattle; Chance Vought Corporation, Long Island City, N. Y.; Hamilton Standard Steel Propeller Company, Milwaukee and Pittsburgh; Northrop Aviation Corporation, Burbank, Calif.; Sikorsky Aviation Mfg. Corp., Bridgeport; Stearman Aircraft Company, Wichita; Stout Air Services, Inc., Dearborn, Mich.; United Aircraft Exports, Inc., New York City.

Build Robin for Photo Use

ST. LOUIS (MO.)—A Challenger Robin, equipped with a glass floor and an opening under the pilot's seat, is being built here for the photographic department of the Curtiss-Wright Flying Service in this city. The camera will rest on a special mount with swivel joints and cushioned fastenings to prevent vibrations while taking pictures.

Take Inventory at Fokker Plant

WHEELING (W. VA.)—In order that inventory might be taken, the plant of the Fokker Aircraft Corporation, near here, was temporarily closed down recently. Production is scheduled to be resumed soon, according to Maj. C. C. Lightner, general manager.

To Begin Publication Of Aero Law Review

NEW YORK (N. Y.)—America's first air law review will make its appearance Jan. 1, under the sponsorship of New York Universal School of Law, according to Prof. Allison Reppy, of the N. Y. U. law faculty, editor of the *New York University Law Review,* who will edit the new publication scheduled to appear monthly.

Plans for the *Air Law Review* include interpretations of all aviation and radio cases appearing in the courts, and of issues under discussion concerning both. It will be international in scope and operation.

The aviation advisory board for the new review includes Col. William J. Donovan, former assistant attorney-general of the United States; the Honorable W. Jefferson Davis, member of the air-law committee of the American Bar Association; Mabel Walker Willebrandt, former assistant United States attorney-general and now counsel for The Aviation Corporation; D. H. Oppikofer, head of the air law department, University of Koenigsberg, Germany; Dr. W. Hoffman, editor of *Archiv für Funkrecht,* Leipzig, Germany; M. Robert Harmburg, editor of *Revue Juridique Internationale de la Radio-Electricité,* Paris; and Maj. Gen. John F. O'Ryan, attorney and president of Colonial Airways.

The radio advisory board for the review are John W. Davis, ex-ambassador to England an internationally known lawyer; Col. Manton Davis, general counsel for the Radio Corporation of America; Aubrey L. Ashby, general attorney for the National Broadcasting Company; M. Albert Pirman, president, Comiteé Juridique Internationale de la Telegraphique sans fil, and president of the French Inter-Ministerial radio commission, and the Honorable Wallace A. White of Maine, sponsor of the first radio bill in Congress.

According to Professor Reppy, the publication of the *New York Air Law Review* is but the beginning of a larger program concerning aviation and radio, details of which will be announced later.

Wright Income Reported

NEW YORK (N. Y.)—Figures recently released concerning the financial status of the Wright Aeronautical Corporation, show that the income for the quarter ending Sept. 30, amounted to $299,331, equal to $.50 per share on 600,000 shares of outstanding capital stock. During the corresponding quarter of 1928, receipts amounted to $899,253, or $1.49 on the same share basis. The first nine months of this year, a net income of $1,653,828 was reported, while in 1928, the same period furnished a net balance of $1,992,130. In the first half of this year, company profits of $1,354,497 were announced, which amounted to a gain of $261,620 over the first six months of 1928.

National Show Plans Progress

ST. LOUIS (MO.)—Plans are well under way for the National Air Show, to be held here Feb. 15-23. The Curtiss-Steinberg Airport and its facilities will be placed at the disposal of authorities in charge of the exposition, by Maj. James K. Tully, manager. It is hoped to have both the air terminal building and first school dormitory ready.

Keystone Awarded $1,067,829 Navy Bid

WASHINGTON (D. C.)—Keystone Aircraft Corporation, Bristol, is to furnish the Navy Department with eighteen patrol planes of the flying boat type, according to the Department. The contract amounts to $1,067,829.

To be similar to the PN-12, they are likely to be designated the PK-12 and will contain several features which will make them an improvement over the older type. The new craft will be especially suited for long distance work and for operation from a land base or tender, but not from an airplane carrier, as they have to be raised and lowered from the water to the deck, by means of a derrick or crane.

A crew of five, including two pilots is usually carried by the PN-12's, which are biplanes, powered with two engines. That type of plane holds two records for distance, two for speed, and two for duration flights.

Third Quarter Receipts Of U. A. & T. Announced

NEW YORK (N. Y.)—After taxes and charges, including preferred dividends, United Aircraft and Transport Corporation announces earnings of $2,838,332 for the third quarter of 1929. Based on 1,782,427 shares of outstanding stock, this is at the rate of $1.48 per share.

Though the Standard Steel Propeller Corporation and the Sikorsky Aviation Corporation were acquired during September, the earnings of those two companies were used as capital. The United firm reports satisfactory returns from Boeing Air Transport, Inc., Pacific Air Transport, and Stout Air Services, Inc.

The second quarter produced earnings of $2,608,034, or $1.52 per share on 1,594,619 shares. The first nine months showed net profits of $7,249,937, equal to $3.74 per share on 1,792,427 shares, following preferred dividends.

Non-Stop Flight for "Defender"

AKRON (OHIO)—The Goodyear non-rigid airship "Defender" is being groomed for a non-stop flight from Akron to Miami, the date of departure depending entirely on weather conditions. Jack Boettner will be in command of ship on the trip of approximately 1,100 mi., with Ray Roderick and Samuel Shepherd accompanying him. The journey is expected to require 24 hr.

Questions of Crash Liability Arise Anew

WASHINGTON (D. C.)—The recent crash of the Fokker F-32 in Long Island again has raised the question of the liability of aircraft owners or operators to damages arising from destruction of property. A number of states hold the owner or lessee of the aircraft as liable for damages, regardless of whether negligence can be proved. This provision is rather an unusual one in the history of transportation, as, in the majority of cases, negligence must be proved. The states in question are: Delaware, Indiana, Michigan, North and South Carolina, Rhode Island, Utah, Wisconsin, North and South Dakota, Idaho, Maryland, Nevada, Tennessee, Vermont and Hawaii.

Air rights over property have been brought into court many times. The almost universal verdict has been that they go with the property only when they are directly connected with the use of the land. Courts have forbidden a man shooting, or a mule kicking, over another's property, but they have not forbidden a plane's flying over it. In the case of Johnson vs. Curtis Northwest Airplane Company, 1923, the judge ruled that the "upper air is a natural heritage common to all of the people."

Low flier freed in Los Angeles

In July, 1928, the case of People vs. Burdette, Fuller, et al, was tried in the Municipal Court, Los Angeles. The offense involved was that of low flying over residences, which was alleged to constitute a nuisance. A verdict of not guilty was rendered, the judge declaring that airplane transportation is recognized by the government, and that railroads cause as much noise and dirt and are, perhaps, as dangerous as airplanes.

In regard to collision and property damages, legal opinion holds that aircraft operators are liable in the same degree as would be the operators of automobiles. Airport owners have been held liable for damages to spectators, courts holding that the responsibility for providing sufficient safeguards for the public rests with them. In the case of Platt vs. The Erie County Agricultural Society, the Society, which was holding a fair, was held liable for damages resulting from the wing of a plane hitting a child.

The most recent suit against an airport is the present case of Swetland vs. Curtiss Airports Corporation. Swetland seeks to enjoin the Curtiss company from the establishment and use of its Cleveland airport, alleging trespass by planes flying low over surrounding property in taking off or in landing. The case is to be heard in Cleveland Dec. 10.

Breese Firm in M.A.A.A.

PORTLAND (ORE.)—Breese Aircraft Corporation announces it has become a member of the Manufacturers' Aircraft Association of America, New York City.

TACOMA PUBLIC LIBRARY

Fokker Believes Subsidies Harmful

Tells of Study Abroad On Return to New York

NEW YORK (N. Y.)—Back from a European trip undertaken in the interests of his company and to study conditions of foreign air transportation, Anthony H. G. Fokker, noted airplane designer, declared the government subsidy system was proving detrimental to airlines abroad.

"The beautiful airports in Europe give a wrong impression of the actual conditions of commercial aviation, which are generally bad and not economically sound," declared Mr. Fokker. "I am thankful we have no subsidies in this country and that our government is restricting its assistance to the building of airways and not interfering with the development or operations of commercial types of planes or lines for any military reasons."

Lines Operating at Loss

Singling out the Luft Hansa as an example, Mr. Fokker stated that the company was filled with more commercial planes of various types than it could operate economically. Many European lines, he continued, are virtually "keeping up appearances" and running their routes without sufficient traffic to make them economically worthwhile.

Speaking of the advantages of the subsidy, the Dutch aircraft designer said it had helped in some places, notably, in Germany, where Dornier, Junkers, and Rohrbach have been given valuable assistance in experimenting with land planes and flying boats.

While abroad, Fokker visited the Junkers Aircraft Works at Dessau, the Dornier Aircraft Works at Friedrichshafen, and some factories in Italy and France, as well as his own plant in Holland. He declared the aircraft industry in Europe is composed of some 75 or 80 factories building planes and 30 or 40 producing engines. He asserted the programs of many of these manufacturing centers covered a multitude of analogous types. Exactly the same designs are being developed in eight to twelve factories in different countries.

Slump a "Cleaning Out Process"

"A big contrast, is the healthy development of commercial aviation in the United States," asserted Fokker. "The present slump in aviation securities and the industry in general, is really a good thing and is a sort of 'cleaning out process.' It will have no effect on the aeronautical enterprises which are properly organized and financed and where their progress is dependent on engineering development and commercial leadership."

Concerning this country's future in aviation, Mr. Fokker believes day and night flying lines will supplement the air-rail lines by next summer and that the industry as a whole will again stride forward very certainly in the coming year. However, he thinks that regular trans-Atlantic flying will not be established until planes capable of cruising at 200 m.p.h. are perfected and not until a complete weather service on the ocean is organized, along with more perfectly developed of radio equipment for aircraft.

Mr. Fokker will return to Europe in about three weeks to put into actual use the plans he is developing for a world-wide Fokker sales organization combining his American and European interests and preventing duplication of effort and production. He will be aided in this undertaking by the General Motors Corporation through its many branches and contacts.

General Motors recently acquired a 40 per cent interest in the Fokker Aircraft Corporation of America, though the aviation firm will continue working as a separate unit, declared its president. Mr. Fokker denied the report that the motor company would acquire the Nederlandsche Vliegtuigenfabriek, in Holland, of which he is president.

Plans Smaller Amphibions

Concerning the recent acquisition of the American Dornier rights by General Motors, Mr. Fokker said it was likely his company and the German firm would co-operate with General Motors and there would be no conflict of interests, as the one aviation company manufactures flying boats almost exclusively, while the Fokker concern specializes in land planes.

Mr. Fokker told AVIATION'S representative however, that he is planning to produce smaller, and perhaps larger, type amphibions than the type already being built by his firm. He further stated that if he ever did manufacture biplanes, they would only be of a small army type, as he is a firm believer in the future of monoplanes, rather than the two-winged craft. He also declares large planes are safest when equipped with four engines rather than three, while a single-engined machine is safer than a twin-engined plane.

It is planned to produce F-32's and other large type Fokker planes at the Los Angeles factory which is expected to be completed within the next five months. Approximately 1,000 workers will be employed in the plant, which will have 600,000 sq.ft. of floor space. In the meantime, the 32-passenger Fokkers ordered by Western Air Express, and several others of that type, are being built at the Teterboro, N. J. factory. Three-engine planes will continue to be constructed at the Wheeling, W. Va., location, while the single-engined planes are being produced at the Passaic, N. J., factory.

Mr. Fokker declared the diesel aircraft engine is being developed and experimented with abroad, mainly in England and by Junkers in Germany, but it has not passed the trial stage as yet.

When asked his opinion as to who should regulate air laws and regulations, he said "the less regulation the better, but I think it should be left up to the federal government and that a uniform set of rules should be established all over the country.

He said that the gyroscopic pilot was bound to come and that it might be employed sometime in the future on planes produced by the Fokker firm.

Costes Record Put at 4,912 Mi.

NEW YORK (N. Y.)—According to reports received here, the distance record established by Dieudonne Costes and Maurice Bellonte in their non-stop flight from France to Manchuria early in October has been put at 7,905.14 km., or 4,912.01 mi., by the Aero Club of France.

Reserve Officer Replies To C. B. Allen's Charges

WASHINGTON (D. C.)—In defense of conditions of Air Reserve bases and the lack of proper equipment, which were criticised recently by Lieut. C. B. Allen, of the Reserve and aviation editor of the New York *World* newspaper, the Chief of Air Corps has authorized a statement prepared by Capt. E. H. Holterman of the Reserves. Holterman has had two active duty periods during the past two years, of six months each and believes the Air Corps officers gladly give aid to the Reservists.

He disagrees with C. B. Allen who cited poor facilities at Mitchel Field for the Reserve fliers and says that the officers there prepare an interesting course for the two weeks allotted to the men, but many of them seem to regard it "as only an opportunity for a vacation with pay."

Declares D-12's Kept for Reserves

Speaking of a shortage of planes, Captain Holterman declared it was not the fault of the officers at Mitchel Field and that D-12 Falcons were kept in readiness for Reserve pilots whenever possible and the Regular Army Officers often flew Liberty-powered planes. As to procuring more craft, "They must remember they have free speech and a voice with Congress; more influence than men who cannot very well speak for themselves," he added.

He stated that Maj. William Ord Ryan's orders to "wash out" Reserve pilots who did not have Class 1 qualifications, was followed by every effort on his part to raise the men to that standard.

Army Lacks Planes, Says F. Trubee Davison

WASHINGTON (D. C.)—The promotion problem and the shortage of planes, were cited as two of the most important things to be considered, by F. Trubee Davison, Assistant Secretary of War, in his recent report, stating himself in favor of the Furlow bill which has passed two sessions of Congress, or the Air Corps provision of Senate Bill No. 4, as introduced by Senator Reed.

"As the enlisted strength of the Air Corps is increased in accordance with the five-year program, the proportion of grades and ratings allotted to the Air Corps is decreased. As enlisted increments are added to the Air Corps, the only grades and ratings provided with those increments are those which belonged to the units of nontechnical branches of the Army disbanded to give the Air Corps it quota of enlisted men.

"These units, being nonmechanical, do not contain anywhere near the proportional number of grades and ratings which should be assigned to such a highly technical and mechanical branch as the Air Corps.

May Complete Five-year Program

"The Air Corps, on account of the nature of its mission and equipment, must have well-qualified and experienced mechanics of a great number of classes. The only way these men can be kept in the service after they have trained, is to award them grades and ratings commensurate with their skill and duties."

Mr. Davison believes the five-year program can still be fulfilled if sufficient funds are forthcoming and the personnel situation is cleared up. At the end of the second increment, June 30, 1929, 1,143 officers of the Air Corps were commissioned and detailed while the program called for 1,237; 220 Reserve officers should have been on hand while there were actually only 110 assigned to active duty on account of lack of money, though 192 were ordered to duty; planes on hand numbered 1,273, with 201 ordered, but the program called for 1,345 craft; as for two sessions Congress failed to appropriate money for airship development called for at Scott Field, Ill., and Langley Field, Va., no new equipment has been purchased nor have plans been carried out. The airship school at Scott Field has been closed.

Want More Reserves for Duty

The Assistant Secretary wants the law to be so changed as to permit a larger number of Reserve fliers on extended active service during the second year following training. At present, only 10 per cent of the Reserve Officers graduated from the flying schools can be given active duty for a year after graduation.

In reviewing fatalities, the report stated there had been 60 Air Corps deaths, to nine regular, one Naval and thirteen Reserve officers, and 36 regular and one reserve enlisted man. Air Corps men and Reserves were in the air for 263,381 hr. and flew more than 26,300,000 mi. during the fiscal year. Mr. Davison stated he believes the Army will eventually discard primary training centers, their place being taken by commercial schools, and concentrate its efforts on advanced type training.

May Make Golden Eagle in Ohio

COLUMBUS (OHIO)—R. O. Bone, Los Angeles, Calif., manufacturer of the Golden Eagle, a two-place monoplane, plans to produce craft of that type here if he can secure the necessary $200,000 financial backing for the venture. This is according to a statement made by William F. Centner, superintendent of Port Columbus.

Airworthiness Rules Passed by Oregon Body

SALEM (ORE.)—All airplanes operating in the state of Oregon, not otherwise federally licensed, must have in addition to their state registration, an airworthiness certificate issued by the Oregon state board of aeronautics.

This decision was reached by members of the state board, plane manufacturers, pilots and state officials in conference here, and will be signed by Governor Patterson, it is said.

The airworthiness certificate shall indicate whether the plane is to be used for commercial or experimental flying. Airplanes manufactured under approved type certificate issued by the Department of Commerce, or planes eligible for a federal license for commercial use, will be issued an airworthiness certificate, if they are found to be in safe flying condition.

Other aircraft will be issued an airworthiness certificate after having successfully passed engineering flight tests, as adopted by the Aeronautics Branch, and other tests. These include a sand load test of 60 per cent of the design load as determined by the Department of Commerce load factor curves. This may be omitted at the option of the state board upon submission of complete stress analysis on the airplane.

If at any time when any airplane is being flown, it is found not to comply with the foregoing rules, the airworthiness certificate shall be canceled by the board. The rules adopted will remain in effect until the next legislature, when a law will be sought similar to those in operation in other northwest states.

Of the firms, Rankin Flying Service and West Coast Air Transport, with four each, have the largest number of planes licensed in Oregon by any individual or corporation. Pacific Air Transport and Varney Air Lines also keep a number of planes with a base in Oregon, but they are not state licensed as they operate on interstate commerce. Of the 63 planes which are registered by the state, about 50 per cent are owned by private individuals, according to a report just issued by Hal. E. Hess, Secretary of State for Oregon.

Hoover Asks Congress For Air Service Funds

WASHINGTON (D. C.)—In a message to Congress on Dec. 2, President Hoover said the following in connection with appropriations for the air service:

"Under the Air Service programs for the Army and Navy, I am asking for a total of $33,000,000 for the procurement of airplanes, their engines, spare parts, and accessories. In addition to this, I am asking for the same purposes for the Coast Guard, Department of Commerce, and the National Advisory Committee for Aeronautics, a total of $460,000. With regard to the Army, provision is made for the procurement of the 443 airplanes pertaining to the fourth increment of the 5-year program authorized by the Congress.

"This program calls for 1,515 planes to be on hand and on order on June 30, 1931, and it is believed that this goal will be reached or closely approached by the funds already appropriated and the amounts estimated in this Budget. The present shortage in the program is about 40 planes pertaining to prior increments. No amount has been specifically included in the 1931 estimates to make up this shortage in view of the possibility of its reduction or complete elemination before the final increment is reached. Concerning the Navy Air Service, the last, or fifth, increment of the 5-year program authorized by the Congress will be reached in 1931. This program contemplates about 1,000 planes and 2 lighter-than-air ships to be on hand and on order at the close of that fiscal year.

Estimates Cover Various Plans

"To accomplish this, provision is made for the procurement of 269 airplanes, including their equipment, and for continuing the work on the two lighter-than air ships now under contract. In additions to the amounts which we are spending for the acquisition of aircraft we are also spending large sums for lighting and equipping airways, the inspection and licensing of commercial planes and pilots, and furnishing weather reports necessary to the carrying on of aerial navigation.

"For these purposes there is included in the estimates of the Department of Commerce $8,925,830 and in those for the Weather Bureau of the Department of Agriculture $1,400,000. It is estimated that by the end of the fiscal year 1931 there will be about 18,400 miles of airways lighted and equipped."

Ball Buys Moundsville Firm

MOUNDSVILLE (W. VA.)—According to Edward Ball, president of the American Aircraft Corporation of Pittsburgh, his company has acquired the Moundsville Airplane Corporation, manufacturers of the Lone Eagle plane. Former president of the West Virginia firm, Mentor Hetzer, has been made a member of the American company's board as have James A. Sigafoose and Walter McGlumphy.

Dornier Discusses Large Flying Boats

They Are Practical for Sea Work, He Says in Interview

NEW YORK (N. Y.)—Dr. Claudius Dornier, of the company which bears his name, who is now in America to complete arrangements for the manufacture of Dornier machines here, is confident of the place of the gigantic flying boat and of the future of flying boats in general in oceanic operations. In an interview with a representative of AVIATION, he indicated some of the points that seemed to him especially important and also outlined some of the work done in the evolution of the design of the Do. X.

"I do not believe," Dr. Dornier said in response to an inquiry about his opinion on the future of open-sea commercial operation, "that we can look forward to the possibility of taking off from a seriously disturbed ocean surface with any type of flying boat. It should, however, be possible to take off from ordinary ocean swells running 10 ft. or more in height, and that can most easily be done with large boats by running along the troughs and taking off cross wind.

Several Planes Have Withstood Sea

"Of greatest importance is the ability to land and to ride out even the most severe storms upon the surface without danger of disintegration of the structure. With large boats properly constructed the commanding officer's mind should be free from worry on this score. The prolonged exposure to open-sea conditions of Captain Franco last year, and of Major Locatelli in 1924, are encouraging evidence of the ability of flying boats to stand rough treatment."

Both Franco and Locatelli, it will be noted, were flying Dornier Wal boats. Other notable records of survivals for long periods in the open sea have been made by two of the trans-Atlantic NC boats in 1919, by Comdr. John Rodgers' PN9 on its attempted flight to Hawaii, and Gen. de Pinedo's Savoia two years ago.

Do. X Sturdiness Described

"Although even the smaller boats have set such an excellent record," Dr. Dornier continued, "they are very uncomfortable on a rough surface because of the motion and because of the beating of the waves against the sides and bottom, which so shakes the structure as to make it almost impossible to get any rest. This will be much less serious in planes as large as the Do. X, for the occupants will be farther removed from the skin of the hull and less affected by shocks from it. Furthermore, the local impacts will be better resisted since it is possible to greatly increase the thickness of the skin in large planes. In the Wal, the thickness of the skin in the neighborhood of the step is but .006 in. In the Do. X it has been increased to .020 in. in that region, and everywhere below the waterline it is at least .010 in. As an assurance against loss of stability due to local damage, which has been responsible for the loss of a number of flying boats fitted with auxiliary wing-tip floats, we extensively subdivide the sponsons that furnish stability to our hulls, each one having nine watertight divisions in the new large machine.

"There is no inherent difficulty in the building of these very large types, but their general employment will depend upon some further development in detail, and especially upon improvements in power plants," continued Dr. Dornier, who stated that he is anxious for engines of larger units of power and especially of greater fuel economy. The advent of the Diesel, of course, holds out hope in both directions.

Interested in Declutching Propeller

"We were not given a free choice of the number of engines that would be used on the Do. X, for the employment of at least twelve became obligatory when the total power was decided upon. No engines of large enough unit powers were available to produce the total in fewer units."

Among the specific technical developments in which Dr. Dornier is particularly interested is the declutching of a propeller from its engine, so that the propeller can spin freely after the engine is stopped, with much reduced air resistance.

The designer of the Do. X, of which type two additional examples have already been put under construction at the Dornier factory in Switzerland, is a firm believer in the division of responsibility on boats of great size and in the relieving of the pilot of any direct responsibility for command. Even in the early tryout flights a representative of the Dornier company was present to act as co-ordinator between the pilot and the engineer officer and other members of the crew, and the pilot was entirely ignorant of what was going on with the power plants except for a general knowledge of the average r.p.m. at which they are running. He regulates that by two throttles which control all the engines.

The construction of the Do. X, representing as it did a very long step in advance over the largest boats previously built, was preceded by elaborate studies and tests. The layout of the hull was developed in a mock-up which alone cost $20,000 to construct. An exhaustive series of wind-tunnel tests were made at the Göttingen laboratory, these being so extensive that their cost ran nearly to $15,000. Tests of the hull were conducted in the towing basins at Hamburg and Berlin.

Airplanes Used By Coyote Hunters

KANSAS CITY (KAN.)—Coyote hunters employ airplanes, it seems. L. W. Leib, manager of the American Eagle Aircraft Corporation, Minneapolis branch, declares hunters fly over the snow-covered hunting territory at low altitudes, scaring the animals from their hiding places. Then, by making a vertical bank at the right moment and pouring a charge of buckshot into the coyotes, there's nothing more to do but return for the pelts. It is claimed three or four killings are often made this way in half an hour—and pelts average $20.

Fairchild Expanding Its Pontoon Markets

FARMINGDALE (L. I., N. Y.) — Announcement is made here by the Flying Boat and Pontoon Division of the Fairchild Airplane & Manufacturing Corporation that the firm will offer pontoons suitable "for the majority of airplanes manufactured in this country." In entering the general field, the concern has built a wide range of floats designed to meet the needs of standard craft from 1,550 lb. gross loading to 11,300 lb. The work is under the direction of F. P. H. Beadle, designing engineer for the Flying Boat and Pontoon Division.

The firm has just delivered the largest set of pontoons it has thus far turned out to the Ford company for use on a Ford tri-engined monoplane. The set is built for a gross loading of 11,300 lb. Each float is 29 ft. long, 41 in. in beam, and 38 in. deep. Each weighs 510 lb.

These floats are of the standard Fairchild type, made of Alclad on spruce and ash framework with six watertight compartments.

Boeing Canadian Plant Active

VANCOUVER (B.C.)—An announcement states that the first of a fleet of Boeing six-place flying boats, now under construction at the Boeing Aircraft of Canada plant here, will be ready shortly before Christmas. Plans are being made to start production on mail-planes of the 40-B series and on the new three-place training school craft being developed by the company. These last type machines are being slightly redesigned for Canadian service, the chief change being the incorporation of a landing gear which will permit the planes to be equipped with wheels, floats, or skis. The Vancouver unit is also busy conducting a survey of Australian and New Zealand flying conditions, preparatory to an advertising and sales campaign to be started there in April.

Active Licenses Now Total 9,279

Budwig Reports Issuance of 28,738 Student Permits

WASHINGTON (D. C.) — There are now 9,279 active pilots' licenses, 6,482 active airplane licenses, 3,109 plane identifications, and 7,196 active mechanics' licenses, according to a report made public by Director of Licensing and Inspection, Gilbert G. Budwig, on Dec. 2. At that time, 28,738 student permits had been issued.

Some 271 aircraft have been issued approved type certificates, 32 engines have been so designated, and 134 propeller certificates have been granted. Approval has been given to twenty-two flying schools, 88 flying instructors have been approved and 129 ground instructors have been sanctioned by the Aeronautics Branch.

The number of approved type certificates issued during the past fiscal year, amounted to 121 for aircraft, 21 for engines, and 28 for propellers. Examinations were made of 65 different type of planes and the same were approved without being granted approved type certificates, while thirteen engines were dealt with on the same basis. A total of 248 approvals were granted for airplanes, engines, and propellers, during the year.

Growth in Physical Examinations

Through Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, a statement has been issued, showing 28,153 physical examinations of trained and student pilots were made during the year 1928-29, while only 11,688 occurred the preceding year. A total of 9,000 were examined in the last quarter of the past fiscal year alone, while during the same period in 1928, only 4,500 persons were inspected, it was stated.

The 9,000 figure does not include some 2,500 examinations received during the year which were not checked because of lack of personnel. On account of the rapid rate of increase, it is expected about 12,000 will be examined in the first quarter of the new fiscal year. At that rate, the 1929-30 total should approximate between 45,000 and 50,000.

In addition to the large number of medical inspections made in the past twelvemonth, 1,209 pilots were reexamined and certified for a higher rating. Contacts were made with the inspector in the cases of 600 trained pilots to determine the advisability of granting waivers.

Plan to Divide Country

On July 1, 1928, there were 366 medical inspectors, while the number had increased to 704 on June 30, 1929. By the end of the next fiscal year, officials believe there will be some 1,000 persons serving in this capacity. The office directing this work thinks the country should be divided into five districts to obtain the greatest possible efficiency in handling this work.

A district flight surgeon would have charge of each, interview all applicants in his territory, and coordinate with examiners already appointed in the section. Later, if the country is districted for licensing purposes, it is believed these surgeons could handle the physical examination checking for the district.

Inspectors to Issue Permits

More responsibility has been thrown on the examiners this year by permitting them to issue letters of authority to student pilots; and their work will be further increased this year, as they will be allowed to give out the actual student permits.

Owing to a lack of time, a report covering a study of all aircraft accidents from a medical standpoint incurred during the calendar year 1928 and data on rejected students to determine the character of their defects have not been prepared yet, but information on these two subjects is on hand, it is announced.

New Firms Announced

LOUGHEAD BROTHERS AIRCRAFT CORPORATION, LTD., Los Angeles, Calif.; capital 175,000 shares of "B" stock and 50,000 shares of "A" stock, no par value; by Allan and Malcolm Loughead, W. G. McAdoo, J. L. Maddux, Ray Acre, Erle P. Halliburton, Fulton G. Hoge, G. Sadler, Edward F. Andrews, Lawrence W. Scudder.

AIRPLANE ADVERTISING CORPORATION, Boston, Mass., and Poughkeepsie, N. Y.; capital $100,000; by John A. Miller, J. Lee Manning, Edwin H. L. Carr.

GREAT PLAINS AIRCRAFT COMPANY, Hastings, Neb.; capital $100,000; to conduct a flying school and engage in transport operations.

DETROIT-WAYNE INDUSTRIAL AIRPORT CORPORATION, Detroit, Mich.; capital $2,000,000; by James I. McClintock, George M. Stelwegen, Russell Gardner; to construct, equip and operate airports.

SOUND AIR TRANSPORT COMPANY, INC., Bellingham, Wash.; by J. R. Scott, Will Anderson, Tim Healy, A. J. Sunel; to operate a flying school.

AIRPLANE APPLIANCES CORPORATION, Los Angeles, Calif.; by C. M. Fuller and others; to manufacture the McLeod reversible propeller and an electric starter for airplanes.

ACE TRANSPORTATION COMPANY, INC., Salisbury, Md.; capital stock $100,000; by J. Edgar Hastings, Frank J. Karle, Joseph W. A. Evans.

CLINTON AIR TRANSPORT COMPANY, Clinton, Okla.; capital $20,000; by H. R. Gilcrist, J. D. Simpson, P. R. Cooper.

CALIFORNIA AIRCRAFT EXPOSITION ASSOCIATION, LTD., Los Angeles, Calif.; no capital stock; by W. P. Halderston, Robert Pritchard, Robert Porter, Fred A. Worthey, and others.

BRADSHAW WING PROPELLER CORPORATION, Oxford, N. C.; capital $100,000; by Frank F. Bradshaw, S. P. Booth, and others.

KELSO AIRPORT, Kelso, Wash.; capital stock $25,000; by J. E. Stone and others.

SKY VIEW, INC., Fort Meyers, Fla.; capital 600 shares, par value $100; by A. C. Garvey, C. Franklin, E. Bailey.

ARIZONA AIR SERVICE, Phoenix, Ariz.; by Wayne Thornberg, Jack Thornberg, V. Van Zele; to operate a flying school and taxi service.

Off From an Auto

THOUGH THE PRACTICABILITY of the idea is to be questioned, here it is—a plane taking off from an automobile! With the four-wheeled aircraft carrier (a Hudson) attaining what is reported to have been 52 m.p.h., the airplane successfully took off from the framework fitted to the auto roof for the experiment. The smooth beach at Old Orchard, Me., furnished the runway.

As for participants, Alexander Krapish piloted the Moth, Ira J. Snow, the car, and twenty other men, news photo cameras.

"The stunt brings back memories," stated Harry D. Copland, operations manager of Curtiss-Wright Flying Service of New England, when he heard of the event. During the war, Copland witnessed an experiment at Fieldstowe, England, in which Captain Frisby, of Toronto, piloted an HS flying boat with a Bristol scout plane fastened to its top wing. When the big machine rose to about 500 ft., Lieutenant Harvey, in the Bristol, released the fastenings and flew clear—so says Copland.

Congress Gets N.A.C.A. Report

Hoover Submits Document; Data Cites U. S. Leadership

WASHINGTON (D. C.)—In the fifteenth annual report of the National Advisory Committee for Aeronautics, prepared by Joseph S. Ames, chairman and submitted to Congress by President Hoover on Dec. 5, the following conclusion was presented:

"The United States leads other nations in the use of aircraft for commercial purposes; in the private ownership and operation of aircraft; in the extent and lighting of airways; in the provision of weather report service; in the number of airports and intermediate landing fields; in the development of radio communication and directional finding facilities; in the transportation of mail by air; in crop dusting and forest patrol by air; in aerial photographic surveying and mapping; in the development of cowling for air-cooled engines and engine starters; in the development of catapult-launching and deck-arresting devices; and in the development of parachutes.

Asserts We Lead in Army Planes

"In addition, the United States has taken the lead in the analysis and study of causes of aircraft accidents. America is abreast of other nations in the development of military types of airplanes, in its airship development program, in the development and use of metal construction for aircraft, and in the development of air-cooled and fuel-injection engines.

"America is definitely behind other nations in the development of seaplanes, floats and in the development and use of seaplanes, water-cooled engines, and large air transports, and also in the development of air passenger traffic. America holds the world's altitude record but is far behind in maximum speed.

"The authorization by Congress of a seaplane channel for the committee, will enable America to improve her position in the matter of seaplane floats, which will permit the building of better seaplanes. The committee has recently recommended a program for the development of liquid cooled engines, which are deemed essential for the attainment of maximum speeds.

Growth Without Subsidies

"It is only a question of time, in the committee's judgment, when America will lead the world in air passenger traffic, for it is producing the requisite technical knowledge, so to improve the safety and efficiency of aircraft as to bring this about without direct cash subsidies, and for the further reason that its great area will make an important factor of the time to be saved by air travel.

"We are, however, confronted as are other nations, with the serious fundamental problems of increasing the safety and decreasing the costs of aviation. The committee feels that the answer is to be found through scientific research. The committee is grateful to the President and to the Congress for the support that has been given to scientific research in aeronautics.

"The committee believes that the continuous and systematic study and investigation of the basic problems of flight is the most fundamental activity of the Government in connection with the development of aeronautics and in the discharge of its responsibility under the law recommends the continued support of its work in the fields of pure and applied research in aeronautics."

Comments on Air Transport

Other extracts from the report, which is divided into five sections, are as follows:

"The most significant fact in the progress of aeronautics during the past year is that the airplane has found a place in the transportation needs of the country. Its accelerated development as a military weapon during the Great War gave promise of its ultimate successful use for purposes of business and of pleasure.

"A decade ensued of scientific research, of military experimentation, and of earnest study and application of fundamental principles of aerodynamics, and we now witness the airplane used regularly with increasing safety and efficiency, on a growing network of airways, carrying more and more passengers, mail, and merchandise, at steadily decreasing costs.

"It is difficult accurately to appraise the significance of the present period of transition through which we are passing. The rapid advancement of technical science and increased economic pressure are bringing results steadily in improving the safety and efficiency of aircraft.

"The Federal government has followed a wise constructive policy for the development and encouragement of the civil uses of aircraft upon a sound economic basis. The temporary overexpansion in certain phases of the aircraft industry is but characteristic of new and promising industries in America.

Safer and Cheaper Planes Awaited

"All of the experience with aircraft, governmental and private, emphasizes the need for greater safety and greater efficiency, for despite the wonderful record of progress and accomplishment there are accidents, and aviation is still expensive.

"The airplane must be made safer and less costly. On these major problems the committee is concentrating most of the efforts of the Langley Memorial Aeronautical Laboratory at Langley Field, Va., the facilities of which are being expanded under appropriations made for the purpose. In this connection the committee wishes to express its appreciation to the President and to Congress for the liberal support by the government of scientific research in aeronautics.

"Money expended in this direction is constantly yielding new knowledge obtainable in no other way. The members of the National Advisory Committee for Aeronautics are enthusiastic over the prospects for the future of aeronautics in America and, while not making prophecies, nevertheless firmly believe that with the continued support of co-ordinated scientific research, there will be continued progress in the solution of the basic problems of increased safety and of increased efficiency in aviation.

"With an appreciation that the main theoretical foundations of this new science have been laid and that its further advances will be along the lines of extensions of or additions to existing theory, the aeronautical research laboratories in the United States have been largely engaged during the past year with problems relating to aerodynamic safety and efficiency," the report reads in part five.

"In any general survey of the problems studied by the National Advisory Committee for Aeronautics in the past, or the problems to be undertaken in the future, it is highly important that the influence of the immediate technical requirements of air commerce and the military and naval services be recognized. To meet these requirements a large part of the research program of the committee is concerned with problems of immediate technical interest to the services and the industry.

"The major problems contemplated or now under investigation are concerned with some phase of the general subject of safety in flight. The most important of these are the studies of spinning, low-speed control, stability, and load distribution under various conditions of flight.

"A second group of almost equal importance is concerned with problems of aerodynamic improvement by the reduction of drag. A third group is concerned with problems relating to general design and operation, such as landing and taking off, local loading on wings, propeller characteristics, and the prevention of ice formation.

"The problem of spinning is at present considered the most important of all the investigations now being undertaken by the committee. There are two phases of this problem, the prevention of spins from unintentional stalls at low altitude, and the uncontrolled spin generally known as the flat spin. Considerable progress has already been made in the study of this problem and the present research programs call for the intensive study that the importance of this subject justifies.

"The great economic question confronting aeronautics at this time is, 'Are the people willing in increasing numbers to pay the present cost of air travel?' We think not. Costs must be reduced to a competitive basis where after making allowance for time saved and for the inherent attractiveness of air travel, the costs will be fairly comparable with other means of transportation. We believe this can be done, but not by governmental regulation of rates and services.

States Improvements Needed

"The problem of reducing costs, however, is too involved to be accomplished in this manner. It is easy to see that reduction in unit costs can be accomplished by increase in volume, but volume cannot be satisfactorily increased with costs as they are.

"The answer is to improve the airplane; make it lighter and stronger; make it faster and more controllable; make it carry more pay load and consume less fuel and oil; construct it more simply and cheaply and make it easier to maintain and overhaul; make it more reliable by improving methods and facilities of air navigation; improve the landing and take-off characteristics of the airplane so as to enable it to land and take off in small areas—in short improve its aerodynamic efficiency and make it more controllable, especially at low speeds.

"All of these problems are included in the current research programs of the committee, and the efforts of all existing agencies, governmental and private, are co-ordinated in an organized plan to solve them."

C.A.C. Orders Total $4,500,000

BUFFALO (N.Y.)—With orders approximating $4,500,000 on the books now, Consolidated Aircraft Corporation expects its 1929 earnings to nearly equal those of last year, therefore netting approximately $1,300,000, officials state. Present activities of the company include work on a parasol wing craft, with the cockpit in the rear, but rather similar in construction to the new "Fleetster." According to George M. Pynchon, Jr., plans are being made for the production of a new amphibion plane, to be powered with Wright J-6 engines. Delivery on the third of the twelve Commodores for the Rio and Buenos Aires Line will be made shortly. Orders for seventeen additional planes of that type have been received recently, according to Mr. Pynchon.

British Dirigible to Come in May

MONTREAL (QUE.)—One of the new British dirigibles is due at St. Hubert Airport, May 1, 1930, it has been officially announced here.

Schools and Colleges

PARKS AIR COLLEGE, East St. Louis, Ill., has inaugurated a special course for private pilots, to include 28 hr. flying.

UNIVERSAL AVIATION SCHOOLS, St. Louis, Mo., are furnishing flight students with $2,500 insurance against accident while at the school.

LION AIRCRAFT COMPANY has opened a flying school at Eugene, Ore., under the direction of Lee Inman, president.

EDGEWATER FLYING CLUB, INC., Chicago, Ill., whose students built and flew their own plane last summer, has changed its course to meet Department of Commerce requirements, and will apply for a certificate of approval.

VON HOFFMANN SCHOOL, St. Louis, Mo., has inaugurated refresher courses, given to former students at no charge except for actual use of planes.

CLEVELAND INSTITUTE OF AVIATION, Cleveland, Ohio, has started a course in gliding.

RAPID AVIATION, INC., students will build a plane this winter at the school shops, Omaha, Neb.

DETROIT SCHOOL OF AERONAUTICS, Detroit, Mich., will offer a two-session per week night school in aero-mechanics and aerodynamics, under the direction of E. N. Wright.

ARROW FLYING SCHOOL, Havelock, Neb., will open a special division for training flying school instructors.

UNIVERSITY OF SOUTH DAKOTA students, at Vermillion, S. D., will have an opportunity to supplement their college training in aeronautics by actual flight training.

UNIVERSITY OF TEXAS, Austin, Tex., has 39 students registered for the degree of B.Sc. in aeronautical engineering.

PENN SCHOOL OF AVIATION, Pittsburgh, Pa., has organized a section for women students.

Unger, Brooks Win at Hadley

NEW BRUNSWICK (N. J.)—The final races of the Hadley Field Air Meet were held here Nov. 28, having been postponed twice on account of bad weather. Snow squalls, and a biting wind combined to cut the number of both entries and spectators to but a fraction of those who participated in and witnessed the first day's events, Nov. 16. Results of the Nov. 28 competition were as follows:

OX-5 Race: First, Kenneth Unger, Curtiss Robin; Second, Carl Rasmussen, Travel Air. 510 cu.in. Race: First, Kenneth Unger, Curtiss Robin; Second, Morgan Harding, Air-istocrat. Aerobatics Exhibition: First, Pete Brooks, Travel Air; Second, Kenneth Unger, Air-istocrat. Free-for-All Race (No restrictions as to engine displacement): First, Pete Brooks, Travel Air; Second, Willard van Beuren King, Travel Air. The prizes consisted of cash awards and trophies presented by local merchants.

Offers Movable Landing Light

DETROIT (MICH.)—Allied Products Corporation announces production of a new type retractable landing light for planes, which can be moved to project the beam either downward or forward. When not in use, the light is folded back into the wing of the plane, thereby eliminating wind resistance. Firm officials state this device was made possible by the acquisition of the Capell patent, while the principle of the Ilco Ryan-Lite automobile light has also been employed.

Boeings to Canadian Firm

SEATTLE (WASH.) — Sale of three Boeing 40-B4 mail four-passenger Hornet-powered planes to Western Canada Airways, Ltd., for use on the Canadian transcontinental air mail service has been made for immediate delivery, according to officials of the Boeing company. The 40-B4's have a high speed of 135 m.p.h., cruising speed of 115 m.p.h., landing speed of 57 m.p.h., climb 800 f.p.m. to a service ceiling of 15,100 ft. They have special night flying equipment. The Canadian government is now lighting the Prairie section of the route. The planes, are bonded, shielded and wired for radio. The Canadian route will have two radio control stations immediately, at Winnipeg and West Alberta. This is the second purchase of Boeing equipment by Western Canada Airways.

General Buyers to Expand

BUFFALO (N. Y.)—Negotiations for the acquisition of control of aviation concerns, both in the plane and engine field, are being conducted by the New York interests which purchased the assets of the General Airplanes Corporation, insolvent Buffalo firm, two weeks ago, according to an announcement by J. W. Bishop, operations manager of the company. It is planned by the present management that manufacture of the Aristocrat plane will be continued and that with the acquisition of other plane and engine plants, the whole shall be merged into a larger concern to be known as the General Airplanes Corporation.

Refute High City Altitude Plan

NEW YORK (N. Y.)—In order to demonstrate their belief that the proposed New York City minimum altitude regulation is not fitting, Ive McKinney and Eddie Brooks, both flying R.S.V. planes on a recent day, shut off their engines at 3,000 ft. above Central Park, and glided with the help of a favoring wind, to safe landings at Holmes Airport, Jackson Heights. Police Commissioner Whalen had recommended that all aircraft keep to levels above 7,000 ft. when flying over New York City, deeming this necessary following the recent crash of a plane near Central Park.

General Tire Fleet Finishes 32-State Tour

AKRON (OHIO)—With the arrival at the General Tire and Rubber Company factory here, of seven orange and black "Aristocrats," a tour covering over 20,000 mi. through 32 states came to an end. Sent out by the rubber company last spring in the interests of commercial aviation and to test out several rubber safety devices, the craft were in the air for more than eighteen weeks, an estimate discloses.

The planes were manned by Air Corps fliers from the First Pursuit Group, stationed at Selfridge Field, Mt. Clemens, Mich., who were released from duty last June for the trip. At that time, the fleet flew to Washington, D. C., where it was formally dedicated under the auspices of Maj. Gen. James E. Fechet, head of the Air Corps. His daughter, Miss Mary Fechet, christened the flagship, "General Jim," in honor of her father. President Hoover welcomed the pilots during their stay in the capital city, as did Vice-president Charles Curtis and Sen. Hiram Bingham, of Connecticut, president of the National Aeronautic Association.

General Lockheed Participates

An analysis of the log books at the end of the tour showed it had taken approximately $1.05 per mile to operate the entire fleet, exclusive of salaries and expenses of pilots and officials. Figuring on gasoline, oil, hangar space, repairs, mechanics' wages, depreciation, and passenger and liability insurance, officials state each plane was run for about 15c. a mile.

Lieut. Henry J. Brown, winner of the Los Angeles-Cleveland air derby during the last National Air Races, won that race in the flagship of the General fleet, a Lockheed powered with a 525 hp. Hornet engine. Other planes on the tour, used Warner Scarab 110 hp. engines.

Those from the First Pursuit Group who made the country-wide flight, were; Lieut. Arthur C. Lybarger, fleet commander; Lieut. J. Stanley B. Harvey, finance officer; Lieut. Robert K. Giovannoli, fleet engineer; Lieut. Sheldon B. Yoder, fleet technician; Lieut. Horace J. Reid, meteorologist; Lieut. Murl Estes, Lieut. Alfred Kalberer, and Lieut. Robert K. Black,

Western Show Profits Shared

LOS ANGELES (CALIF.) — Cliff Henderson, Western Air Show managing director, has sent a letter to all exhibitors in that exposition stating that they shall participate in a pro rata distribution of 10 per cent of the net profits of the show, which was a financial success. The remaining profits, of course, go to the Aeronautical Chamber of Commerce and the local association to be used in their respective programs for the development of commercial aviation.

PERSONNEL

H. A. REED, recently Western Air Express pilot, has been made assistant superintendent of operations for Mid-continent Air Express on the Denver-Kansas City and Denver-El Paso routes.

WILLIAM E. BOEING is chairman of the board of the newly formed United Airports, Inc., division of United Aircraft Corporation. THOMAS F. HAMILTON is president, and GEORGE WHEAT, vice-president.

William E. Boeing

CHARLES BRADFORD BEACH, president of L & H Aircraft Company, Hartford, Conn., has resigned as operations manager of Colonial Flying Service at Hartford. He is succeeded by LIEUT. FREDERICK SANSOM.

H. R. BRUNELL, formerly Omaha traffic manager for Universal Air Lines, is now promotion and sales manager for Pioneer Aviation Company in that city.

WALTER GREENE has been made student instruction pilot at Dennison Airport, Boston, Mass.

NORMAN G. WARSINSKE has been appointed manager of the newly organized school division of Canadian-American Airlines, Inc., Minneapolis, Minn.

C. G. CHADWICK is now general traffic manager of Northwest Airways, Inc., air mail operators in Wisconsin.

MILDRED STINAFF has been made test pilot for General Tire & Rubber Company, Akron, Ohio.

CHARLES W. MARIS is now pilot for Colonial Air Transport on the Boston-New York route.

WALTER STORRIE, member of Wyoming Aeronautics Board, is now sales manager of Hartland Aviation Company, Tulsa, Okla.

SAM BREDER, formerly sales manager for the Lockheed Aircraft Company, has been named vice-president of Steel, Inc., Simmons Aircraft Division.

WALTER E. ALLEN, has been promoted to the position of manager of the Curtiss Wright Flying Service in Toledo, Ohio.

JOSEPH F. WESTOVER has joined the pilot staff of Universal Aviation Corporation at St. Louis.

MISS LORRAINE DEFREN, formerly with Boston Airport Corporation, is now head of the publicity department of Skyways, Inc., Boston.

E. W. SIMPSON has been elected president of Falls City, Neb., Flying Club, member of N.A.A.

ROY H. WARNER has been made pilot for Varney Air Lines, on the Portland-Salt Lake City route.

HARLAN GURNEY, recently assistant operations manager for Universal Aviation Corporation at St. Louis, has been promoted to the position of operations manager for Continental Airlines there.

C. M. MCCALL has been named airport manager at Wewoka, Okla.

VICTOR F. LOOMIS is in charge of the aviation division of the Automotive, Electrical and Aviation School, Aberdeen, S. D.

VERN C. GORST will be a director and associated with the management of Air Ferries, Ltd., San Francisco.

MISS RUBYE THOMPSON has been named hostess at Love Field Airport, Dallas, Tex.

CHARLES CAIN is now field manager for T.A.T. at Wichita, Kan.

GEORGE SILKA, recently instructor for Sprott-Shaw School of Aviation, Vancouver, B. C., has organized a new firm known as Commercial Airways, Ltd.

CLIFFORD MUTCHLER, formerly of Los Angeles, has been appointed general manager of West Coast Air Transport with headquarters in Portland.

LEONARD M. POVEY, Springfield, Mass., has been made pilot for Pan American Airways on the Miami-Havana route.

DOUGLAS H. DAVIS, Atlanta, Ga., has been appointed southeastern manager for Curtiss-Wright Sales Corporation. JOHN GILL succeeds him as divisional manager for Southern Air Transport at Candler Field.

Douglas H. Davis

ARNET SPEER, sales manager of Airtech School of Aviation. Lindbergh Field, San Diego, has been appointed sales manager of Airtech Flying Service, Ltd.

F. E. POTTER has been made chief instructor in aeronautical engineering at the University of Texas, Austin, Tex.

H. L. BROWNBACK has resigned as engineering director of Brownback Motor Laboratories, Inc., but retains his position as vice-president.

Representatives Named

CURTISS AIRPORTS CORPORATION—R. W. Bush, Glendale, Calif., for western United States; R. F. Hayes, East St Louis, Ill., for the Middle West.

NICHLAS-BEAZLEY (Barling NB-3)—L. C. Thornton, Los Angeles, Calif., for California, Arizona and Nevada.

ALLIANCE AIRCRAFT—John B. Lewis, Providence, R. I., for Rhode Island.

PYLE-NATIONAL — Western Aviation Supply Company, Los Angeles and San Francisco, Calif.; Nicholas-Beazley Company, Marshall, Mo.; Johnson Airplane & Supply Company, Dayton, Ohio.

INLAND—Schlee-Brock Aircraft Corporation, Detroit, for Michigan, Indiana, Illinois, Wisconsin, Minnesota.

BRIEFLY

Proposal to operate a local air mail service between Portland and Grants Pass, Ore., to serve Salem, Corvallis, Eugene, Roseburg, has been made to the Post Office Department by James G. Clark and C. C. Coleman.

A system of radio navigation for planes developed in France by William Loth will probably be demonstrated this month in Washington. John J. Ide, European technical assistant for the N.A.C.A., is returning to this country to take the matter up with the Bureau of Standards.

Hamilton Aero Manufacturing Company plant at Burbank, Calif., will probably be completed this month.

Stock-selling activities in connection with The Helioplane Company of America, Fort Worth, Tex., are being investigated by state authorities.

Entrants in the Western Glider Meet, held at Hollywood Riviera Field near Rolando Beach, Calif., beginning Dec. 1, included Vic Evans of the Vic Evans Glider Company, and W. H. Bowlus of the Bowlus Sailplane Company.

Water-cooled engines of 600 hp. each may be used to replace the aircooled engines now installed in the Bellanca "Tandem," built for the Chicago *Daily News*, in the hope of avoiding cooling difficulties which have been encountered.

A 14-passenger amphibion, known as the Sea Devil and built by Century Aircraft Company, Chicago, Ill., is expected to be test flown this month.

The all-metal monoplane designed by H. V. Thaden and built by Pittsburgh Metal Airplane Company, subsidiary of Pittsburgh Aviation Industries Corporation, is now undergoing test flights.

Fort Wayne (Ind.) *News-Sentinel* has purchased a Ryan Brougham for business and advertising purposes.

An expansion program planned by Ex-Cell-O Aircraft & Tool Corporation, Detroit, Mich., has been postponed, and the company has withdrawn its offer to purchase Govro-Nelson Company, according to N. A. Woodworth, president.

With the aid of a 40 m.p.h. tail wind, a plane in the service of Canadian Airways, Ltd., recently set a record of 1 hr. 50 min. for the 340-mi. run between Montreal and Toronto.

West Virginia Airways, Inc., is reported about to lease the proposed municipal airport at Charleston, W. Va.

An aviation news bureau has been established at Love Field, Dallas, Tex., with B. F. Riddle as director of publicity. It is maintained by three local newspapers and the airport operators.

Baltimore Airways, Inc., is planning a bi-weekly service to Miami, Fla., for passengers and light freight.

Pyle-National Company has designed a new 40-ampere switch to control airplane landing lights.

West Palm Beach, Fla., has been made a port of entry for air traffic, and

24 then have been added to the federal customs force in the state to care for increased traffic during the winter.

Viking Flying Boat Company announced plans for inaugurating a service between Miami, Fla., and northern cities, to begin about Dec. 1.

Operation of the Oakland-San Jose air mail route has been resumed by Pacific Air Transport, following change of landing field after complaints by San Jose residents.

Plans are being made for a convention of airport directors to be held in connection with the Cincinnati, Ohio, Aircraft Show, Feb. 8-15.

A record of 196,937 lb. of mail carried by National Air Transport, Inc., during October, makes it probable that the company's business during the last quarter of the year will be larger than during any of the preceding periods. Universal Air Lines also reports an increase of 6,000 lb. for October over September.

Intercity Air Lines, operating between Yakima, Wash., and Wenatchee, has been sold to interests in Portland, Ore., accordance to Don Phillips, manager.

Lighting of the air route between Miami and Jacksonville, Fla., will probably be completed by Jan. 1.

Goodyear Zeppelin Corporation will take two blimps to Miami for the winter, to be used for instructing students. Students at Akron will also be transferred.

More stringent flying regulations in the state of Maine will restrain transport and taxi firms from operating except at two-way, or better, fields.

A special slow race, to demonstrate low landing speed, was held recently at Hadley Field. The slowest speed was made by a Gates RSV convertible monobiplane flown by Capt. Ive McKinney.

Two round trips daily between Seattle, Wash., and Vancouver, B. C., are now made by Alaska - Washington-British Columbia Airways, Ltd. The plane is a Lockheed Vega.

After spending some time at Los Angeles, the planes and pilots comprising the American Eagle Aircraft Corporation's goodwill tour moved on to Roswell, N. M., for the dedication of the airport there Dec. 4.

Fire insurance rates on brick airplane hangars and their contents have been reduced 25 per cent in Texas.

Effective Dec. 1, the Houston-Dallas-Fort Worth schedule of the line operated by Southern Air Transport was changed to make connections at Fort Worth with the company's Tulsa-Fort Worth and Dallas-El Paso lines.

It is expected that arrangements will soon be completed with the Chicago school board for a long-term lease of the board property which is being developed as a municipal airport. The field will probably be 620 acres.

The Chicago Air Officers Reserve Association gave its annual ball Dec. 5 at the Opera club.

A sextant operating on a pendulum principle and suitable for use in aircraft has been invented by Capt. John L. Larson of Chicago. It is said to operate without use of horizon or "star sight" at night.

Aeronautical Products Company, Naugatuck, Conn., is experimenting with a four-in-line aircooled engine.

Le Roy Thompson Memorial Airport, Bethany, Conn., is to have a government weather station.

The Wichita - Oklahoma City passenger line operated by Universal's Central Air Lines division was discontinued Dec. 1 because of lack of traffic.

Glendale, Calif., plant of Fokker Aircraft Corporation was closed one week for inventory beginning Nov. 26.

Cherryland Airport, Sturgeon Bay, Wis., donated by Reynolds Preserving Company, has been reclaimed by the company because of the county's failure to improve the field.

Rapid Aviation, Inc., Omaha, Neb., has taken over the American Legion hangar at the municipal airport.

Pickwick Latin-American has started operation of its line from Los Angeles to San Salvador. The trip takes three days.

Repairing and overhauling base for New York, Rio & Buenos Aires Line will be at Miami, Fla., for planes operating between Para, Brazil, and New York City.

Ludington Philadelphia Flying Service has made an average reduction of 10 per cent in rates to Atlantic City, Camden, N. J., and Baltimore, Md.

A movement to have the first of the new Navy dirigibles named "Akron" has been launched by Congressman Francis Sieberling.

Southwest Air Fast Express had its largest month in October, carrying 1,600 passengers.

More than 75 per cent of the floor space available at the All-American Aircraft Show, to be held in Detroit April 5-13, has already been reserved, according to a recent announcement by Ray Cooper, secretary of the aircraft bureau of Detroit Board of Commerce.

Schlee - Brock Aircraft Corporation, Detroit, Mich., is planning to inaugurate a fly-it-yourself service available in Detroit, Minneapolis, St. Paul and Duluth. Hourly rates are $15 for open biplanes, $50 for cabin planes, and $125 for three-engine machines.

Varney Air Lines have purchased two additional C3R Stearmans for use on the West Coast.

Yakima, Wash., has just formed a chapter of National Aeronautic Association, and plans for chapters are being made at Spokane, Wash., and Wausau, Wis.

Dr. Hugo Eckener is to receive a gold medal from the National Geographic Society.

AERONAUTICAL CALENDAR

Dec. 9-14	Baltimore-Washington Aircraft Show, Baltimore, Md.
Dec. 10-16	National Aviation Week, Mexico, including air show and air display at Mexico City.
Dec. 16	Regional Airport Conference for New England, Bridgeport, Conn.
Jan. 13, 1930	S.A.E. Aeronautic Meeting, Miami,
Jan. 21	S.A.E. Annual Meeting, Detroit, Mich.
Feb. 5-12	New York Aviation Show, auspices Aviators' Post, American Legion.
Feb. 8-15	Cincinnati, Ohio, Aircraft Show.
Feb. 15-23	International Aircraft Exposition, St. Louis, Mo.
Feb. 20-22	Second Annual Aviators Reunion, Aviation Post No. 601, American Legion, Chicago, Illinois.
Mar. 6-15	Second Annual Pittsburgh Aircraft Show. Motor Square Garden, Brown Boulevard, Pittsburgh, Pa. Office is Aero Club, Pittsburgh, William Penn Hotel.
April 5-13	All-American Aircraft Show, Detroit.
May 3-10	New York Aircraft Salon, auspices Metropolitan New York Division, Distributor-Dealers Section, Aeronautical Chamber of Commerce, at Madison Square Garden, New York City.

AIR MEETS

Jan. 13-15	All-American Air Meet, Miama, Fla.
Dec. 15	Los Angeles Metropolitan Airport

TRADE TIPS

It has been reported that

Construction rights for the Westland Widgeon, built in Europe by Westland Aircraft Works, Yeovil, England, are for sale in America. Negotiations with several firms are already under way.

Willard V. B. King, Hadley Field, New Brunswick, N. J., is considering the purchase of a plane for racing purposes.

Bids for lighting equipment on the four fields over the Pasco-Spokane air mail route, and for intermediate beacons, will be received after Dec. 19.

Albuquerque (N. M.) Airport, Inc., has called for bids for a steel hangar to cost about $25,000.

Bids for lighting equipment on the Washington-Pittsburgh section of the Washington-Cleveland air mail route will be accepted until Dec. 20. Blanks may be obtained upon application and deposit of $5 from Chief Clerk, Department of Commerce, Washington, D. C.

M. E. Hulse, western division manager of Consolidated Instrument Company, located at the Wichita (Kan.) branch, is negotiating for western representatives for the firm.

Bids for construction of a hangar 115 x200 ft., to cost about $85,000 and be of cantilever construction, are being received by Karl L. Fieseler, city purchasing agent, St. Paul, Minn.

Bids are being considered for construction of a hangar at Albany Airport, Albany, Ore.

A. W. Parker, constructing quartermaster, Randolph Field, Schertz, Tex., has plans ready for bids for eleven hangars, each to be 110x220 ft. in size.

AIRPORTS AND AIRLINES

Southwestern Mail Route Hearing Held

Selection to be Made Within Two Months

WASHINGTON (D. C.)—Wide-spread interest in the southwestern air mail route was evidenced at the hearing held here Nov. 25 by the Interdepartmental Committee on Airways. Over 300, including some 30 members of Congress were present, representing governors, mayors, cities, chambers of commerce, business interests, and airlines. Such interest and attendance have not been shown before, at an airway hearing and augur well for the success of whatever route is chosen.

In opening the hearing Postmaster General Brown stated that the southwestern portion of the country was the only part not adequately served by the air mail, and expressed his confidence in the future of that section of the United States. Mr. Brown said that he did not regard as of major importance the locating of any particular city on the direct line as the development of feeder lines of 200-300 mi. long would give effective service. This seems to show a somewhat changed viewpoint on the Postmaster General's part, as a few weeks ago he was represented as favoring the abolition of the short hops, or their extension to a length of 400 or 500 mi.

Appropriations Promised

Assurance that Congressional appropriation for the southwestern route would be forthcoming was given by Senator Brattan, of the Senate Appropriations Committee, and several members of the House Appropriations Committee, in response to Mr. Brown's statement that the only reservation the Post Office Department would make concerning the route was that Congress must furnish the money.

Air mail as a means of national defence was stressed by a number of congressional speakers. A significant statement on that score was made by Representative Collins of the House Appropriations Committee, in remarking that he believed it was better to appropriate money to the air mail than to the Army or Navy because of the economic return on the investment.

William Gibbs McAdoo, chairman of the board of Southern Sky Lines, Inc. and former secretary of the treasury, was the only airline operator to address the committee. In connection with the present governmental attempt to stimulate industry, Mr. McAdoo suggested the development of air mail lines as a means of relieving the depression existing in aviation manufacturing.

Although the most detailed and determined plea for a position on the southwestern air mail route was made by St. Louis, briefs were presented to W. Irving Glover, acting chairman of the Interdepartmental Committee, by practically every city of any importance in Georgia, Alabama, Mississippi, Louisiana, Oklahoma, Texas, New Mexico, and Arizona. Apprehension was expressed by some representatives of Gulf coast cities that the existing Atlanta - New Orleans - Houston line might be abandoned or neglected in the adoption of a more northerly route, but such is evidently not the intention of the Post Office Department. The desire of the southern Texas cities for an extension of their air mail facilities is so strong that Houston offered to light

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Tampa Votes $750,000 For Port

TAMPA (FLA.)—At the recent election a bond issue of $750,000 to be spent for the construction of a municipal airport for land planes and seaplanes was voted and a committee has been appointed to select a site for a complete port. The committee is composed of F. L. Judd, vice-president of the Tampa Union Terminal Company, Franklin O. Adams, architect, and representatives of the Army, Navy and the Aeronautics Branch.

Braniff to Resume Operations in March

NEW YORK (N. Y.)—Having repurchased the name and operating rights of his airline, sold last January to the Universal Aviation Corporation, Paul R. Braniff, pioneer southwest airline operator, recently announced that the new Braniff system will inaugurate service March first of next year. Most of the present schedules or those recently abandoned for the winter by Universal will be resumed at that time, according to Braniff, who announced that Kansas City, Wichita, Tulsa, Oklahoma City, Wichita Falls, Fort Worth and Dallas will be served by the new line. New Fokker Super Universals will be used, three of these were bought in November by Braniff. The new company is incorporated at $200,000.

In commenting on his resignation from the Universal organization, Braniff said: "I have been trying for some time to persuade Universal to reduce rates and to make a bid for larger volume of business. More people are not riding because of high rates than fear. My idea that we should reduce rates, even though it would mean operating at a loss for a time, was contrary to company policy."

Michigan Board Licensing Airports

DETROIT (MICH.)—A total of 28 airports in the State of Michigan have applied and received temporary licenses to operate as airports under the new Michigan State Board of Aeronautics, Capt. Ray Collins, of Detroit, State Director of Aeronautics, announced here recently. The list is being added to daily. The temporary licenses will be valid until the Board completes its inspection of all state landing fields, after which classification will be made, and permanent licenses granted or denied.

Captain Collins recently completed the drafting of a lengthy set of rules and regulations by means of which the state will regulate all flying activities in Michigan. The regulations are somewhat similar to those of the Aeronautics Branch, but contain some interesting departures from the Federal regulations, emphasizing elimination of use of planes or airports not licensed by the Federal government.

Recognizing the importance of adequate flying instruction facilities, the State regulations have been designed with a particular view toward the operation of flying schools. At its last meeting, the Board decided all airports in Michigan, except Selfridge Field, an Army post, will have to pay $10 per annum to the State for privilege of operating under license. The fee for flying school licenses was not decided.

Captain Collins was authorized by the Board to lease office space in the United Building, Lansing, to employ an inspector, whose work will be of part-time nature and whose salary will be $750 per year, and a clerk at a salary of $2,000 per year. The administration has turned $10,000 over to the Board for initial operating expenses. The state's plan to purchase or build a chain of state-owned airports has been temporarily abandoned. Captain Collins maintains Detroit headquarters at his office at the Union Trust Company, Union Trust Building.

William B. Mayo, chief engineer of the Ford Motor Company, is chairman of the Board; the remaining members being Claude S. Karney, Kalamazoo; Frank L. Betts, Menominee; Harry Fletcher, Alpena; Capt. William Sparks, Jackson; and Captain Collins.

Mason & Dixon Halts Line

DETROIT (MICH.)—Effective Nov. 30, Mason & Dixon Airlines, Inc., operator of the passenger and freight service between Detroit and Cincinnati, discontinued service until next March 15, or April 1, it has been announced by R. H. Schryber, president.

Curtiss-Wright Service Reports Florida Growth

MIAMI (FLA.) — Growth of Curtiss-Wright Flying Service, Inc. in southern Florida in its first year of operation from one training plane at the municipal airport to an investment of $225,000 in planes and equipment with an annual payroll of $100,000 was announced by L. W. Botts, vice-president of Curtiss-Wright Flying Service of Florida and manager of the Miami division.

At the municipal airport, the single plane equipment for students has been increased so that nine planes for students and passengers are now on the field. At the marine base in Biscayne Bay, five seaplanes of cabin type have been added, including a Sikorsky which was transferred from the North.

During the first year, 5,200 passengers were carried by the company, 2,500 in land planes and 2,700 in seaplanes, to such points as the Bahama Islands, Cuba and points north. The highest number of passengers carried in any one month was in February, when 688 persons used seaplanes to travel to fishing keys and to points in the Bahamas. The business of the marine service increased so rapidly that it was necessary to open bases at Palm Beach and Nassau.

Expansion plans of the company for the coming year, Mr. Botts said, are now being prepared. The company is erecting a hangar and administration building at the Municipal Airport at a cost of $75,000, and a marine base, is being constructed at a cost of $35,000. The new field and marine bases of the company will be completed by the latter part of December and will be formally opened prior to the air meet, which will be Jan. 13-15. Bases are also under construction at West Palm Beach and Nassau in the Bahamas.

Wabash and S.A.F.E. Co-operate

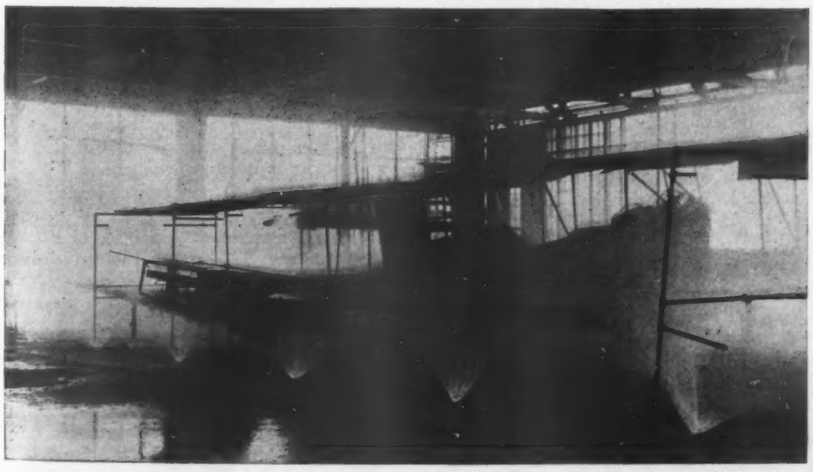
ST. LOUIS (MO.)—Another air-rail hookup, providing for through daily service between Detroit, Toledo, Fort Wayne, Chicago and the Southwest, is announced by the Wabash Railway company and Southwest Air Fast Express. The schedule of the new connections, inaugurated Dec. 1, calls for passengers leaving Detroit at 7 p.m., Toledo at 8:25 p.m., Fort Wayne at 9:45 p.m., and Chicago at 11:30 p.m., transferring to plane at St. Louis the next morning at 8:30 a.m. and reaching Tulsa at noon, Oklahoma City at 2 p.m., Fort Worth, 4:35 p.m., and Dallas at 5.

N. Y. & Rio Building Permanent Terminals

NEW YORK (N. Y.)—Passenger terminals of steel, concrete and stucco finish are being built, or are about to be built, at the four main terminals of New York, Rio & Buenos Aires Line, Inc., at Miami, Rio de Janiero, Buenos Aires and Santiago, Chile. These structures measure 200x180 ft. and include hangar space for about four Commodore flying boats, operations offices and complete passenger accommodations. Spanish style of architecture has been chosen for the company's chain of buildings. Each of these four terminals will cost about $125,000.

Considerable attention has been paid to the method of enplane or deplaning the passengers. A pier will be built with a huge float connected to the end. The top of the float will be about even with the deck of the flying boat. The system will be to maneuver the flying boat along side, the wing projecting over the float without interfering with persons on the float or striking the small house built in the center. These terminals were designed by Dwight P. Robinson and Company, of New York City.

Testing Sprinklers at Newark Hangar "Fire"



SHOWING THE DELUGE system in operation on a set of blazing wings which had been saturated with gasoline. Note the spray shooting upward from the floor vents, a new development for getting at the under side of burning surfaces.

Russians Survey Air Route on Flight

Moscow-New York Trip Part of Commercial Plans

NEW YORK (N. Y.)—The flight of the Russian plane, Land of Soviets, was not only a splendid performance of both machine and crew, but also an indication of the tide of aeronautical activity in that country. Russia has plans for itself in the aviation picture and already has made progress worth making careful note of, especially as Russia, as in about everything else, has tremendous aeronautical potentialities.

The flight to this country, for instance, was more than a good will gesture. One of its most important by-product was a definite inspection of possibilities of the route as a commercial airline for inter-continental transportation. All the various aspects of the flight, such as weather conditions, location of bases, operation difficulties, etc., were carefully studied with this in view. And eventually the American public may be most directly concerned with the outcome of the flight from this aspect.

Confident of Possibilities

The Russian fliers are enthusiastic about the possibilities of an inter-continental airline over the route which they covered in their flight. Several additional surveys would have to be made before such a project could take definite form, but the Russians are convinced that the route is entirely feasible for regular operation except during the winter months. Even all-year operation would be possible, they believe, if extra pains and expense were put into the supporting ground bases. It is hoped by those backing the present flight that funds will be available from American or Russian sources, or both, to finance another survey flight before many months. Nothing definite has materialized in this direction yet although some American interest has been displayed.

Variations would be made according to the dictates of experience. Most of the route would involve over-land flying, while the greater part of that over water would be along the coast, within fairly easy reach of shore in case of difficulty. There are two distinct over-water jumps which would take the aircraft well away from land during all or part of those legs.

Terrain Varies

Between Nikolaievsk and Petropavlovsk on either side of the sea of Okhotsk; the distance is about 750 mi. with practically all of it over water. Between the latter city and Attu on the western tip of the Aleutian Islands, the distance again is about 750 mi., with almost as much of it over water well away from land. A wide variety of terrain exists over other sections, including the mountainous areas of the Ural

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AIRPORT CONSTRUCTION PROJECTS

East

LEHIGH VALLEY Railroad has started preliminary plans for the construction of a spur track from its main line to the Buffalo (N. Y.) Municipal Airport, which will afford the port the facility of direct rail connection.

An appropriation of $55,000, to include funds for a new administration building, permanent improvements, salaries and operation expenses, and new apparatus at Brainard Field, Hartford, Conn., has been requested by the Hartford Aviation Commission. At present the various departments affected, notably the airport manager's office, the weather bureau communications office, and the cafeteria, are widely scattered around the field.

Work will be started soon on the equipping of the Bellanca Field-Wilmington Airport with adequate flood lighting equipment and additional hangars, to comply with the contract recently signed by the Bellanca company and the Wilmington Chamber of Commerce. Passenger and freight stations will be constructed and bus line transportation to the field will be inaugurated.

Curtiss-Wright's new service hangar at the Boston Airport will be ready in about one week. It will be used for storing and repairing planes.

East Coast Aircraft Corporation's new hangar and sales room at the Boston Airport was open for public inspection Dec. 6. This structure cost $100,000.

Central

Yellow Cab Airways, Inc., Des Moines, soon will begin construction of a 40x20 ft. addition to its present office building at the Des Moines Municipal Airport, doubling the size of the building now being used as an office. The new structure will provide space for the radio-plane communication system to be utilized by Boeing. Waiting rooms for passengers, expansion of offices and added facilities for transaction of the company's business will be provided in the new wing. Further improvements of the port are contemplated and will be under way during the next few weeks.

Council Bluffs, Ia., has voted $80,000 for the construction of a second airport in that city, the revenue to be derived from a one-mill levy. This has been adopted in preference to a bond issue which had been voted and then abandoned.

Thompson Aeronautical Corporation, operators of C. A. M. 27, recently celebrated the opening of its new $120,000 hangar on the Pontiac (Mich.), Municipal Airport. The new hangar covers 33,840 sq.ft.

The City Council of Akron, Ohio, has leased airport ground to Air Services, Inc., for the period of 25 years for construction purposes. According to the terms the lessor is to pay $0.01 per square foot the first year, $0.05 the second year, $0.06 the third year, $0.08 the fourth year, and $0.10 the fifth year. At the end of the five-year period the property is to be appraised and an 8 per cent rental on the appraised value is to be fixed. At the end of each succeeding five-year period a similar procedure is used.

The Empire Gas and Fuel Company has acquired a tract of land and begun work on an aviation field west of Bartlesville, Okla. The field includes 400 acres and will be equipped with runways extending east and west and north and south and with a hangar of steel and brick construction. It is expected to be completed by the middle of this month.

Sidles Airway Corporation, of which C. Stuart is secretary, is planning an administration building and hangar at Havelock, Neb., to cost about $150,000.

West

Boeing Air Transport Company expects its Cheyenne hangar completed about Nov. 12. In addition, the company is building an ultra-modern air transportation depot. Cost of the combined structures will be around $150,000.

The sixth large hangar at the Los Angeles Metropolitan Airport has been opened. It is of brick and steel, will accommodate about 25 planes and provide much office space.

A 40-acre tract north of Clarkston, Wash., has been secured by Mamer corporation of Spokane. A branch of its aviation school will be established there.

Consolidated Airports & Express Company, San Francisco, Calif., is reported about to begin development of an airport at Bellingham, Wash., to include repair shops and hangars.

The City Council of Hanford, Calif., has ordered plans prepared for 60x70 ft. hangar to be erected at municipal airport.

Western Airlines, Inc., has begun erection of 44x70 ft. hangar at the Yakima (Wash.) Airport.

South

The corner stone of the administration building at Love Field, Dallas, Tex., was laid recently.

Stout D. & C. Air Lines has requested a frontage of 150 ft. at the Miami Municipal Seaplane base as a terminal for the company's proposed coastal service.

North

Permit has been issued for construction of a 122x145 ft. hangar at the new Curtiss Airport in Granville, Wis., which will cost $65,000.

Plans for lighting the St. Hubert Airport have been completed and the work will be commenced in the near future. In addition to floodlights, an elaborate system of white and colored lights will be placed in a huge circle, 2,400 ft. in diameter. There will be a 200-watt light at intervals of 200 ft. in this circumference of the circle. The conduits are being laid underground and the post holes are ready for the electrical standards.

Russians Survey Line To U. S. on Trip

(*Continued from page* 1131)

and eastern Siberian ranges, plains and uninhabited areas, etc.

A land plane convertible to pontoons for the water stretches was used on this recent flight. For regular service, however, two distinct types are considered advisable by the Russians; for the land sections, a land plane of course would be suitable, but for water stretches only flying boats would do. In all cases the craft must be multi-engined so that the failure of one engine would not force a landing.

Bases for a system which would not be operated except during the winter months need be about 600 mi. apart. This was about the average distance between the stops on the recent flight and the location and frequency of halts seemed adequate. Each base would be equipped with supplies of fuel, food, spare parts, radio, meteorological information and would be prepared for relief work in case of difficulties. Thus provision would be made for about every contingency, eliminating as much hazard from the service as the development of aeronautical aids up to the present affords. In year-round operation bases should be closed.

Hawaiian Schedule Announced

HONOLULU (HAWAII)—Inter-Island Airways, Ltd., which inaugurated a service linking the units of the Hawaiian group on Nov. 11, is operating on the following schedule: On the Honolulu-Maui-Hilo line planes leave Honolulu Monday, Wednesday and Friday at 8 a.m.; leave Maui at 9:30 a.m. and arrive at Hilo at 11:15 a.m.; leave Hilo on the return trip at 2 p.m., leave Maui at 4 p.m. and arrive at Honolulu at 5:15 p.m. On the Honolulu-Kauai line (north from Honolulu) planes leave Honolulu at 8:15 a.m. Tuesday and Saturday and arrive at Kauai at 9:30 a.m.; leave Kauai on the return trip at 2 p.m. and arrive at Honolulu at 3:30 p.m. Sikorsky amphibions are used.

Colonial Cuts N. Y.-Boston Fare

NEW YORK (N. Y.)—The $34.85 fare for the 220-mi. trip between Boston and New York on Colonial Air Transport planes has been cut to $27.88, a reduction of 20 per cent. The round trip tickets now cost $52.97. A 24-trip commutation ticket is available at a cost of only about $22.30 for the individual trip. Schedules remain the same. More than 4,000 persons have been carried in the eight months of operation.

P.A.T. Moves to Burbank

LOS ANGELES (CALIF.) — Pacific Air Transport has moved into its new terminal at United Airport, Burbank, just across the city limit line of Los Angeles. This new airport of 240 acres is owned by the United Aircraft & Transport Corporation.

Boeing Compiles Mail Speed Marks

SEATTLE (WASH.) — Speed records for the respective divisions of the Boeing sections of the transcontinental air mail route have been determined by Boeing Air Transport. The records show:

Oakland, Calif., to Reno, Nev. — 192 mi., Pilot Burr Winslow, 1 hr. 22 min. or 145 m.p.h.

Reno to Salt Lake City, Utah — 440 mi., Pilot Harry Huking, 2 hr. 54 min. or 150 m.p.h.

Salt Lake City to Cheyenne, Wyo.— 414 mi., Pilot A. R. Thompson, 2 hr. 14 min. or 190 m.p.h.

Cheyenne to Omaha, Neb.—476 mi., Pilot H. T. Lewis, 2 hr. 54 min. or 157 m.p.h.

Omaha to Chicago—433 mi., Pilot Reuben Wagner, 2 hr. 30 min. or 173 m.p.h.

The fastest time recorded in the flight of air mail, between Oakland and Chicago was 12 hr. 7 min. flying time, 160 m.p.h.

Pickwick Plans New Line

LOS ANGELES (CALIF.)—A motor stage and airplane service is to be inaugurated in Mexico about the first of the year by the Pickwick corporation, according to Charles F. Wren, president. The new service will be operated between Mexico City and Acapulco, a west coast seaport, and will offer daily bus service and tri-weekly plane service between these points. The airline will carry mail, express and passengers, operating by way of Pueblo. Equipment will be Ryan Broughams of the same type Pickwick is now operating between Los Angeles, Mexico City and Guatemala City. Otto S. Crowder, general manager of Pickwick International Stages, will have charge of operations.

Central Makes Changes

OKLAHOMA CITY (OKLA.) — Because of delay in the development of local municipal airport, Central Air Lines service between Wichita and Oklahoma City has been dropped. A new line has been added by Central with the removal of the Oklahoma City-Wichita route. This is a scheduled air service out of Tulsa for both Ponca City and Blackwell. One round trip is to be offered daily over this route from Tulsa to terminate at Wichita.

Grace Line to Montevideo

NEW YORK (N. Y.)—Pan American-Grace Airways, Inc., on Nov. 30 extended its Santiago-Buenos Aires service east across the mouth of the Plata River to include Montevideo, capital of Uruguay. Mail from that city is expected to reach here in 10 days flying across the Andes, up the west coast of South America and over the Pitcairn line from Miami where the Pan American system ends.

Begin Florida Blimp Hangar

MIAMI (FLA.), Nov. 20—Construction has started on a $50,000 dirigible hangar at Opa-Locks, near here, which will be used by the Goodyear Tire & Rubber Company to house three or four of its small craft. The airships which Goodyear will send to Miami for winter operations will be used in the training of pilots and crews for the government; in research and experimental work; for public officials, city, county and state, in making necessary aerial studies or surveys without any charge; for pleasure flights; and for publicity and advertising. There is also a possibility that the pleasure cruises will include trips to West Indian countries, as well as to all parts of Florida.

Hold Air Mail Route Hearing

(*Continued from page* 1130)

a route west of San Antonio, in advance of congressional appropriation.

No date has been set for the announcement of the route selected, but Post Office officials expressed the hope that it would be within two months. The preliminary hearing on the route was held in June. So much Congressional enthusiasm has been engendered that it is likely the Post Office Department will be stimulated to an early selection.

Among the airline operators present were William E. Boeing, Clifford Ball, Col. Paul Henderson, Hainer Hinshaw of The Aviation Corporation and W. G. McAdoo of Southern Sky Lines, Inc.

Three Routes Proposed

Three principal routes were suggested. They are the extension of the Atlanta - New Orleans - Houston route, through El Paso to the West Coast; the extension of the New York-Atlanta run through Vicksburg or Jackson to Shreveport, Fort Worth, Dallas, Midland and El Paso; and the development of a line running from St. Louis through Tulsa, Oklahoma City, Dallas, Fort Worth and thence to the West. In addition to these main routes numerous variations were suggested, to take in particular localities. According to the various speakers heard, each city in the South and Southwest has a monopoly on sunshine, and a positive scarcity of fog.

The air mail contract formula is still being worked out by the Post Office Department, independently of the operators. No prediction is being made as to when it will be completed. Although no question of the formula has been raised in connection with the southwestern route, and Post Office authorities state their belief that the two matters will proceed without regard to each other, it seems probably that some decision on the formula will have to be reached before the route is advertised.

A deep impression of the public interest and the appreciation by business firms of the advantages of the air mail was made upon the Interdepartmental Committee.

Latécoère Produces Ports For Los Angeles

LOS ANGELES (CALIF.)—Immediate purchase of a county airport has been recommended to the Los Angeles County Board of Supervisors by the Chamber of Commerce of Los Angeles city. The recommendation urges that sufficient land be acquired to provide for all future needs of the county, with sufficient additional adjacent land to permit the establishment of aviation manufacturing concerns in large numbers and to permit of granting free of charge such areas as may be required by the Army or Navy for aeronautical activity in this locality.

This recommendation came to the County Board of Supervisors simultaneously with a report by the Los Angeles County Regional Planning Commission outlining a plan for the ultimate establishment of four major air terminals in addition to the four large terminals now in operation within the county, and the building of 60 local airports to supplement the 52 now in operation within the county. This report was prepared on the basis of a study made by Director Charles H. Diggs, and Chief Engineer W. J. Fox, of the commission.

This comprehensive airport development plan for Los Angeles county, does not necessarily contemplate the erection of these airports by the county itself. The chief purpose of the plan is to definitely set aside those areas which may eventually be converted into airports, and in future to so plan zoning ordinances and county road buildings and real estate subdivisions so that no prospective airport area will be cut up.

Seek Wichita-Omaha Mail Service

WICHITA (KAN.) — Conferences relative to securing an air mail line between this city and Omaha have been held recently under the direction of Postmaster Stewart M. Young. Petitions asking for the establishment of such a line have been circulated at Omaha, Neb., Salina and Belleville, Kan., and here, being the cities which would presumably be served by such a route. It would make connections with Boeing Line at Omaha, and with National Air Transport here. A strong bidder for the contract probably would be Brower Air Service, which has been operating a passenger line over this route for some time.

Curtiss-Wright Ports to Be Open

NEW YORK (N. Y.)—Airports coming under the jurisdiction of the Curtiss-Wright Airports Corporation are not to be limited to the exclusive use of the Curtiss-Wright interests, it has been announced here. A policy of open airports has been decided upon with the reservation that all student instruction and local passenger carrying will be handled exclusively by the Curtiss-Wright Flying Service. Space will be available for lease to transport companies, manufacturers, supply firms, etc.

FOREIGN ACTIVITIES

R. 101 Rides Gale At Mast Successfully

By Aviation's British Correspondent

The British State airship, R.101, fortunately, is really a sound ship for since she came out of the shed the worst weather encountered for years has swept over the British Isles and Cardington in particular, yet all the time the airship has ridden comfortably at the masthead. Now, having withstood a wind at the masthead gusting up to 83 m.p.h. and been subjected to a side blow of a wind which veered 135 deg. in under 60 sec., it may be safely said that all the gloomy anticipations of the airship critics have been confounded and the high tower mooring mast system proved to be perfectly practicable with a ship designed for such methods of attachment.

No airship in the world has ever withstood at the masthead such violent winds or such fluctuations of direction and velocity, as it is hardly necessary to remind American readers, and airship workers in the United States probably will be glad to have the official record of the worst conditions under which R.101 swung at the Cardington masthead for three days:

Time	Average speed m.p.h.	Gusts m.p.h.
Second day 10 a.m.-noon.	39	54
Noon-2 p.m.	33	65
2-5 p.m.....	55	83
5-7 p.m.....	43	64
Second night		
7 p.m.-1-5 a.m.	40	67
frequent gusts over 70 m.p.h.		

A wind of over 75 m.p.h. is counted as of hurricane force so R.101 actually withstood the equivalent of a hurricane at the masthead and during that period the maximum load registered by the stress indicator on the nose coupling was 12 tons as compared with a breaking strain for the coupling of 30 tons. R.33, which was, of course, never built for nose mooring and had an adapted nose coupling, broke away at less than 45 m.p.h., so this is some indication of the advance made. Now the whole problem of the stresses upon an airship has been explored aerodynamically.

There was, however, a worse test to come in the early hours for the ship was struck by a line squall during which the wind not only shifted from Southwest to North in 60 sec., but this violent change was accompanied by a heavy hail storm and a sudden drop in temperature of 12 deg. Thus R.101, before she had been out of the shed a month or flown 30 hr., had to meet the worst possible strain, except perhaps that of violent up and down air currents when in flight, and the force exerted upon a ship over 700 ft. long

(*Concluded on page* 1136)

P.A.A. to Build Panama Hangars

PANAMA CITY (PANAMA) — Pan American Airways has obtained permission from the Panama government to erect hangars at the Patilla Point Airport here and at David.

Lioré-et-Olivier Firm Builds New Flying Boat

PARIS (FRANCE) — The Lioré-et-Olivier firm produced recently an interesting little monoplane flying boat suitable for touring or school work. The machine was turned out, also, to serve as a full-size model to obtain data for the construction of a much larger commercial plane on the same lines.

Several novel features distinguish this little machine, which is of orthodox all-wood construction, with fabric covering. The power unit is a Salmson 120 hp. air-cooled static radial, driving a pusher airscrew, and mounted above the full cantilever wing, which rests directly on the top of the hull. The propeller is driven through a shaft with interesting flexible couplings incorporating Repusseau Silentblocs. Six quickly detachable bolts secure the whole unit to the plane. Fuel tanks are placed inside the wings.

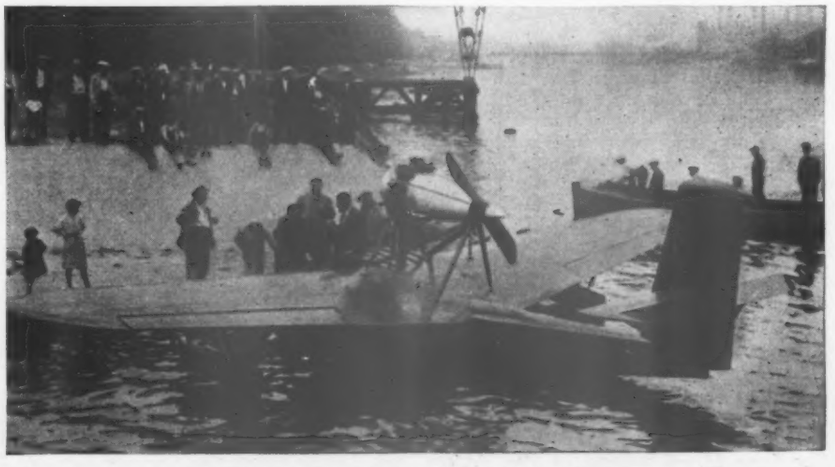
The closed cabin is roomy enough to contain two side-by-side seats, a third seat and luggage space. A special landing gear is provided for use of the machine as a land plane. In fact, the first flight tests were made with the plane so fitted. The main characteristics are as follows: —

Span, 36.6 ft.; length, 24.2 ft.; height, 8.8 ft. Wing area, 184 sq.ft.
Weight empty, 1,435 lb. useful load, 685 lb. Total weight, 2,120 lb.
Performances with 120 hp. Salmson engine: Speed at sea level, 103 m.p.h.; at 6,562 ft., 96 m.p.h. Climb to 6,562 ft., 18 min. Ceiling, 11,500 ft. Range, 411 mi.

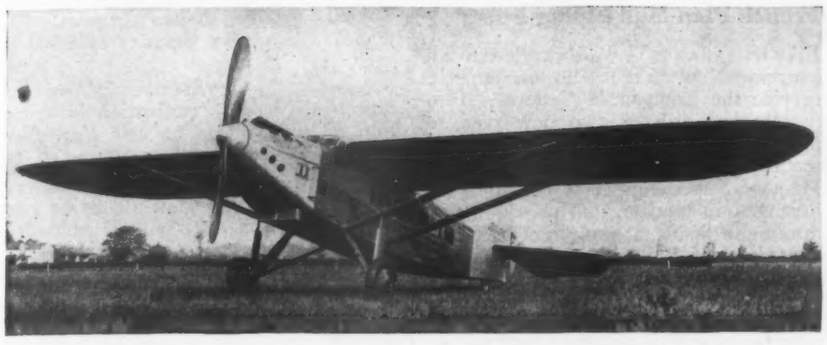
Conference on Aviation Law Meets at Warsaw

WARSAW (POLAND) — Plenipotentiaries from twelve nations have signed the convention regarding aerial transport which was adopted by the second international conference on aviation law, meeting here Oct. 4. This conference was held to consider the recommendations of the International Committee of Technical Experts in Aviation Law, formed at the suggestion of the French government after the first conference on this subject, which was held in Paris in 1925. The committee has been active since that time.

After the election of M. Lutostanski, dean of the Polish faculty of law and head of the Polish delegation, as president, and the election of honorary vice-presidents, the conference proceeded immediately to business. Thirty-two nations were represented, although delegates plenipotentiary were present from only about twelve. The draft of an international convention which had been prepared in advance was not found to be entirely satisfactory, but a special committee succeeded in modifying it satisfactorily within a short time, and it was then adopted, under the title of "Convention for the unification of certain rules relative to international aerial transport." It was not intended to be comprehensive as many of the delegates felt that the time was not ripe for a final determination of international aviation law, but it should serve very well as a working agreement. It is based partly on maritime law, and more particularly on laws relating to international railroads. It will remain open for the signatures of powers intending to ratify it until Jan. 31, 1930.



The latest product of the Lioré-et-Olivier Company



The Latécoère Cabin plane being used by Compagnie Generale Aeropostale

English Confer On Municipal Ports

LONDON (ENGLAND)—A conference of about 250 representatives of 100 English municipalities was held here Nov. 5 to consider the matter of constructing city airports throughout the country. This meeting was a follow-up of the recent tour made by Sir Allen Cobham in the interests of aviation in general and airports in particular. In fact, the conference was organized by Sir Allen Cobham and Sir Charles Wakefield, although the event was actually staged under the auspices of the Royal Aeronautical Society, the Royal Aero Club and the Air League of the British Empire.

The conference was hailed as one of the most important events in British aviation for some time as it served to focus attention on one of the great lacks of British aviation, that is, the scarcity of suitable airports for air transportation uses. The delegates appeared anxious to stimulate in their own localities the development of airport facilities and it is expected that the results of the conference will be far-reaching.

Colonel the Master of Sempill, chairman of the Royal Aeronautical Society, presided. Among the speakers and the subjects were: Maj. L. F. Richard, chief aerodrome officer at Croydon, The Administration of the Airport; Maj. R. H. Nealing, technical assistant in the Department of Civil Aviation at the Air Ministry, The Layout and Equipment of Airports; Sir Allen Cobham, The Selection of Airport Sites; Lord Herbert Scott, Trade by Air.

Mexican Air Week Plans

MEXICO CITY (MEXICO) — Final preparations for Mexico's Aviation Week, Dec. 10-16, are practically complete. Valbuena Flying Field has been specially conditioned for the events. Great Britain has formerly accepted an invitation to participate, and has designated Flight Comdr. Lionel Charlton as its military representative. Entries for the various derbies which will end at this city closed Nov. 30, with a very satisfactory list. The management of the National Railways of Mexico has made arrangements to afford special excursion rates to and from Mexico City during the week.

Continue Junkers Diesel Tests

DESSAU (GERMANY) — Final bench tests of the Junkers Diesel engine are now being made, preparatory to further flight tests. It has already been flown successfully in a monoplane of the Bremen type. An output of close to 1,000 hp. has been recorded.

European Light Plane Tour Prizes Awarded

PARIS (FRANCE) — Results of the European Light Plane Tour (Challenge de Tourisme Internationale) have finally been homologated by the Aero Club of France, confirming the standings as tentatively announced about three months ago. M. Morzik, who flew a B.F.W.-M.23 monoplane with 70 hp. Siemens engine, was first; Capt. Hubert Broad, in a Moth, second; and Lord Carberry, in a Raab-Katzenstein 25 with 85 hp. Cirrus engine, third.

M. Morzik receives a considerable number of prizes, including 100,000 francs ($3,910) from the Aero Club, a Sevres vase from the President of France, a Fiat A.S.1 monoplane from the Italian Air Ministry, a D.K.W. motorcycle, a Gnome-Rhone motorcycle, a trophy valued at 10,000 crowns (about $300) from the City of Prague, and a trophy presented by the City of Hamburg. Captain Broad receives 50,000 francs ($1,955) from the Aero Club, a Fiat A.50 aero engine, and other trophies. Lord Carberry receives 25,000 francs ($977.50), a Gnome-Rhone motorcycle, a pair of Sevres vases, and trophies. Prizes were given to other contestants, including cash prizes for the first ten pilots in the ranking.

French Air Board Named

PARIS (FRANCE) — The board of the French Air Ministry, following the retention of M. Laurent Eynac as Secretary in M. Tardieu's cabinet, is as follows: director, M. L. Couhe; assistant directors, Colonel Duseigneur, chief of military services; M. J. Georges-Picot, inspector of finances; M. L. Kahn, chief engineer of the Naval Engineering Corp. M. Bairet is in charge of parliamentary services, M. Volle is chief private secretary, and M. Monprofit, in charge of missions.

Latecoere Produces New Cabin Machine

PARIS (FRANCE)—The Paris-Madrid route, operated by the Compagnie Générale Aéropostale, uses a new and efficient cabin machine, the Latécoère 28 monoplane, which frequently averaged speed from 140 to 145 m.p.h.

This new machine is a single-engined high-wing semi-cantilever monoplane, powered with a 500 hp. Hispano-Suiza engine. The wing, of rectangular plan form with rounded tips, is of constant thickness; the construction is duralumin for the beams, wood for the ribs, with fabric covering. The fuselage is all-duralumin; the front part is sheet duralumin covered, the rear is fabric. The pilot's cockpit is just in front of the wing and completely enclosed, with two side-by-side seats and dual controls. The passengers' cabin accommodates eight facing forward, with plenty of room. Lavatory and luggage compartment are at the rear of the cabin.

Levasseur-Reed propeller is used. A Renault 500 hp. can be installed. The 181-gal. duralumin fuel tank is placed behind the cockpit. The oil tank is situated close to the engine, with one side directly exposed to the air stream, acting as a cooler. The cooling of the engine is by honeycomb radiator placed under the engine cowling. It is mounted on a retractable device allowing the amount of cooling to be regulated by the pilot. The undercarriage is of the divided type, with large tread and oleopneumatic shock-absorbers. Wheel brakes may be fitted easily.

The general characteristics of the Latécoère 28 are as follows: Wing spread 63.3 ft., length 44.8 ft., height 11.75 ft., wing area, 525 sq.ft.; chord, 6,57 ft. Weight empty 4,400 lb., useful load 4,100 lb. (including pay load of 2,650 lb.). Gross weight 8,500 lb. Performances — maximum speed 151 m.p.h., cruising speed 125 m.p.h., climb to 9,742 ft. 18 min., ceiling 16,400 ft., range with no wind 685 mi.

English Airlines Progressing

LONDON (ENGLAND) — Following a recent request in Parliament as to the status of the proposed Cairo-Cape Town air mail line, it was reported that a survey party consisting of representatives of Imperial Airways and the Air Ministry, has gone to Cape Town to make necessary ground arrangements with the local officials in the countries along the proposed rounte. It was stated at the same time that it is expected about half of the proposed service between Egypt and Australia would be in operation by June, 1930, and the balance within about a year after that. Proposals for the extension of the England-Karachi line to Calcutta are now under consideration by the Indian government. India, by the way, has provided about $900,000 in the current year's aviation budget, including about $130,000 contribution to the cost of the proposed Karachi-Delhi service. This latter will be a part of the Karachi-Calcutta line.

French Chamber Votes More Funds for Aviation

PARIS (FRANCE) — Additional funds for aviation in the 1929 budget have recently been voted by the Chamber of Deputies. A sum of 51,705,000 francs ($2,016,500) was included for new construction and installation, divided as follows: civil aviation, 6,000,000 francs ($234,000); military aviation, 11,000,000 francs ($429,000); naval aviation, 34,705,000 francs ($1,353,500). Colonial aviation will benefit by an appropriation of 10,101,800 francs ($393,970), while 1,000,000 francs ($39,100) is set aside for seriously injured aviators, and 500,000 francs ($19,550) for training of reserve pilots. Finally, 80,000,000 francs ($3,128,000) was voted for army service planes (replacement of obsolete types and allowance for increased cost of raw materials).

In the proposed air appropriations for the 1930 budget, a sum of 6,000,000 francs ($234,600) is included for the breaking of world's records by French airplanes. For breaking the straight-line record, 1,000,000 francs ($39,100) is offered, and for the closed-circuit record, 500,000 to 1,000,000 francs ($19,550 to $39,100), according to the distance covered.

R. 101 Rides Out Gale

(*Continued from page* 1134)

and with a projected side area of about an acre by such a sudden shift of wind can be imagined.

No structural weakness of any sort has been discovered, and the only result of what are entirely exceptional conditions is that owing to the rolling a certain amount of chafing of the gasbags has taken place. It only remains to add that these gale conditions had been forecast by the weather people at Cardington, and the fact that the ship was left at the masthead is a measure of the confidence felt in her strength and a complete justification has now been given of the soundness of the principle of mooring to a high mast.

The only important trial left is an endurance flight of 24 hr. during which the engines and the whole of the installation will have a good chance to develop any faults which may lurk concealed.

Graf Zeppelin Insurance Refused

FRIEDRICHSHAFEN (GERMANY)—The proposed polar flight of the Graf Zeppelin has been beset with continual difficulties, the first of which was the refusal of the crew to undertake so hazardous an enterprise, and now that the misgivings of the crew have been overcome, an almost insuperable difficulty presents itself in the matter of insurance. The Allianz, the biggest German insurance concern, which is understood to be associated with an international group in matters attaching to insurance of aircraft, states that it is unable to accept the risk of insuring the airship.

French Plan Mail Flying Boats

PARIS (FRANCE)—With a view to improvement of France-South America service the Compagnie Generale Aeropostale has ordered two new types of flying boats to be constructed. One is a metal monoplane powered with two Hispano-Suiza engines of 650 hp. each, arranged in tandem, and provided with duralumin floats. It is designed to carry a payload of 1,100 lb. in addition to a crew of four and has a span 100 ft., wing area 538 sq.ft., radius 2,200 mi. The other type projected will be powered by four Hispano-Suiza 650 hp. engines, double tandem; will have a span of 131 ft., a wing area of 825 sq.ft. and a pay-load of about 2,200 lb. Test flights are expected by July next year. Cruising speed of this latter flying boat is projected at 100 m.p.h., top speed at 115 m.p.h.

Foreign News Briefs

Work on the LZ-128 dirigible, which will be more than 50 per cent larger than the Graf Zeppelin, was scheduled to start this week at Friedrichshafen.

Capt. Jose Leon and Lieut. Luis G. Noreiga recently established a new Mexican altitude record of 27,129 ft. in a Douglas plane with Hornet engine.

Resolutions recommending the further use of airplanes for distribution of newspapers, and particularly the changing of an international convention which forbids dropping parcels from planes, were adopted Nov. 29 by the League conference for facilitating European distribution of newspapers at Geneva.

During the fifty trips which it has made to date, the Graf Zeppelin has covered a total distance of 72,648 mi. It has carried 1,574 passengers, and a total useful load of 876,434 lb.

Aeronautic League of Turkey, located at Broussa, will open a school for civilian pilots, intended primarily to train personnel for air mail service.

Successful preliminary flight tests have been passed by a new Italian Rossi seaplane, powered with three 500 hp. Isotta Fraschini engines, which is made to accommodate 34 passengers, or a total load of 6½ tons.

George King, American representative of Junkers Airplane Company, recently piloted the Do.X on a flight over Lake Constance. Mr. King is on his way to Moscow to complete arrangements for an experimental flight of a Junkers plane from Berlin to New York via Russia and Siberia.

The Prince of Wales, who recently purchased a specially equipped Gipsy Moth, has made his first solo flight.

Danish Military Air Force has ordered sixteen Bristol Jupiter engines, series F, from Bristol Aeroplane Company, Ltd.

Arrangements have been completed by Pickwick Latin-American Airways, Inc., for transport of fresh oysters in refrigerator planes from Ciudad Obregon, Sonora, Mexico, to Los Angeles. The planes will have a capacity of 1,000 lb. each.

National Flying Services, of England, now has a sales organization in operation. Used as well as new planes are regularly listed for sale.

A special fast motor lifeboat for service to planes disabled while flying over the English Channel will be housed at Dover.

Official statement by the Under-Secretary of State for Air gives the cost of the British dirigible R.101 as slightly above the estimate of 527,000 pounds (about $2,600,000).

A German Zeppelin hangar built during the military occupation of Lithuania has been sold and will be dismantled.

Henley's, Ltd., one of the largest automobile dealers in London, has acquired a landing field near the city and will sell airplanes. Installment payments and cars in trade are accepted.

Baron Friedrich C. von Koenig Warthausner, who has travelled around the world by ship and his own small plane, arrived back in Berlin Nov. 22.

A new Italian Caproni bomber, with six 1,000 hp. engines and a wing spread of 150 ft., is said to have developed 131 m.p.h. carrying 2,640 gal. of gasoline and nine tons of bombs.

Compagnie Generale Aeropostale has made tentative arrangements with K.L.M. for carrying Dutch mails to South America as well as to Surinam, Dutch West Indies.

Anthony Fokker recently made a gift of $10,000 to the German Aeronautical Society for scientific purposes.

Societe des Avions Potez, of France, has acquired the company manufacturing Anzani engines.

Societe des Moteurs Salmson has established an English branch with a capitalization of 10,000,000 francs ($391,000).

Ministry of Communications and Public Works, Mexico, has turned over to civil aviation schools six Stinson planes bought for emergency purposes during the military revolt last March.

Preliminary flights have been made preparatory to the establishment of air mail service between Mexico City and Guatemala by Inter-Americas Aviation Company.

Col. Gustavo G. Leon of the Mexican Army Air Service is planning a flight to Japan next spring, via San Francisco, Honolulu and Midway Island.

A modern airport is being completed at Puerto Barrios, on the Caribbean coast of Guatemala, as an intermediate stop for planes en route to Guatemala City.

Purchase has been authorized of two three-engined Ford planes for the Chilean army, from funds donated by the Daniel Guggenheim Fund for the Advancement of Aeronautics.

It is proposed to hold an aero exhibition in connection with the international Art Exhibition at Stockholm, Sept. 6-28, 1930.

THE BUYER'S LOG BOOK

Star Pathfinder Compass

THE Star Pathfinder is a compass for aircraft use manufactured by the Star Compass Company, Boston, Mass. and distributed by the Consolidated Instrument Company of America, 41 East 42nd Street, New York City. Special features include a built in compensating

Star flush mounting compass

unit which eliminates the use of loose magnets, and a spherical cover lens permitting the use of the small dial without loss of visibility. The dial is one piece. Three centralizing springs and two large felt washers arrest oscillation and vibration. To permit mounting the compass in very small space, the bowl is suspended at top and bottom only. Flush mounting with removable cover plate gives easy access as well as protection to the compensating unit.

Special types provide for installation flush with the instrument panel or on the face of the panel. Another type is designed for mounting on a horizontal surface, such as outside of the cockpit on the fuselage or within the cabin on the floor.

Hascrome Welding Rod

A MANGANESE chrome iron welding rod called Hascrome, lately placed on the market by the Haynes Stellite Company, Kokomo, Indiana, is a self hardening alloy primarily for building up worn parts preparatory to surfacing them with Haynes Stellite. Hascrome may be used for building up sections of steel or cast iron and forms a satisfactory base for Stelliting because it resists deformation under impact and Haynes Stellite flows onto it with ease. It does not possess red hardness to the same degree as Stellite and will wear away more rapidly.

The oxy-acetylene process is recommended for the application, since the hardness of the deposited metal can be controlled by the amount of excess acetylene used in the welding flame, as well as by the rate of cooling. It is applied to steel without puddling the steel and results are best when the deposit is made just so the steel surface is at a "sweating" heat. The tensile strength is 40,000 and compressive strength 177,000 lb. per sq.in. It can be forged and ground, but not machined.

Hascrome can also be applied by the metallic arc process using reverse polarity and making the rod the positive electrode, but care must be taken to prevent cracking after quenching. Better deposits are obtained when a coated rod is used. Hascrome is available in welding rods ¼ in. in diameter and 36 in. long, packed in bundles of 50 lb. each.

Prest-O-Weld Regulator

THE Oxweld Acetylene Company, 30 East 42d Street, New York City, has added to the Prest-O-Weld line the type R-109 two-stage oxygen regulator, designed to eliminate fluctuation in working oxygen pressures, and superseding type R-105. Two-stage pressure reduction, accomplished through the medium of two independent sets of diaphragms, valves and springs, is the chief feature of the new design. The R-109 regulator reduces the full cylinder

Type R-109 two stage regulator

pressure of about 2,000 lb. per sq.in. down to working pressure in two stages, first through a non-adjustable reducing valve to about 175 lb. per sq.in. The oxygen then passes to a second valve and diaphragm assembly, where the pressure is reduced to that desired by the operator, the second-stage reducing valve being adjustable by means of the hand wheel. This stage is required to regulate pressures within only a narrow range.

When the pressure in the cylinder falls below about 175 lb. per sq.in., the first stage valve remains open and is automatically cut out of the system leaving the second-stage valve and diaphragm operative. The regulator operates when the oxygen cylinder is full or nearly empty, and the working pressure remains constant. Stem-pipe valves, 3,000 lb. and 100 lb. gauges, and a ¼ in. ferrul hose connection are provided.

TRADE CATALOGS

STEEL SHOP EQUIPMENT. The latest bulletin of the Standard Pressed Steel Company describes standard and special "Hallowell" steel shop equipment. Some of the illustrated pieces include locker room benches, several types of foreman's desks, and semi-portable work benches.

COMPRESSORS AND VISES. A complete catalog of equipment of interest to airports, repair shops and garages has recently been issued by the Manley Manufacturing Company, Bridgeport, Conn. Compressors and vises are included and each item is thoroughly illustrated.

OXWELDED PIPING. A 24 page booklet containing information on the installation of Oxy-Acetylene welded piping for industrial uses and also for the heating of domestic and industrial buildings has been issued by The Linde Air Products Company, New York, N. Y.

AIRPLANE FUSELAGE WELDING. Of interest to aircraft manufacturers is the booklet recently introduced by The Linde Air Products Company, New York, N. Y. This 12 page pamphlet outlines correct practices for instruction of welding operators and contains a discussion on the welding of duralumin.

Goodell-Pratt Drill

A NEW, general purpose, quarter-inch electric drill for use in metals and woods, buffing, polishing, grinding, wire brushing and sanding has just been built by the Goodell-Pratt Company, Greenfield, Mass. Equipped with an H & H switch and a Westinghouse Universal type motor for A.C. or D.C., the drill has a capacity of ¼ in. in steel and a no-load speed of 1,700 r.p.m. It is provided with a frame of die cast aluminum and a ribbed, air cooled, pistol grip handle. The G.P. steel chuck with hardened jaws holds 0 to ¼ in. round shanks. This drill, which weighs 4 lb. and has an overall length of 11¾ in., is made for 110 or 220 volts.

WHAT OUR *Readers Say*

A Subsidized Test Bureau?

TO THE EDITOR:

The editorial on flight testing entitled "More Work for the Department of Commerce" appearing in your Nov. 16 issue is very interesting. In view of the fact that the Department of Commerce may be handicapped by insufficient appropriations to the point of being unable to carry out such a program, would it not be possible to organize a flight test bureau with the financial aid of representative companies in the aviation industry and equipped with adequate personnel and instruments? If such an organization is approved by the Department of Commerce, National Aeronautic Association, or Aeronautical Chamber of Commerce, it would seem to me that the information published by that organization would naturally be relied on by users of airplanes as being authoritative.

The writer heartily agrees that there is distinct need of accurate performance data, not only from the purchaser's standpoint but also from the engineer's. That such information must, and will eventually, come through one of the national aviation organizations, is strongly to be hoped for.

WM. KIRKPATRICK,
Amityville, L. I., N. Y.

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Air Race Methods

TO THE EDITOR:

In your issue of October 19, 1929, I was very much interested in the letter of Dr. Don Crawford in regard to method of starting and running the racing events at the 1929 National Air Races and also the broadcasting to the crowd of entries, results, etc.

Having been interested in aviation for a number of years, to the extent of flying my own plane for pleasure and attending every air meet in the Central West since the Gordon-Bennett at Chicago, I heartily agree with Dr. Crawford that the interval method of starting races at the National races has lost the interest of the ordinary attendant even when a competent score-board is operated. I have often wondered why the National Races continue to run in this manner, necessitating many special stunts or events to maintain interest.

As the take-off of any plane is of as much interest to the public as its speed in the air, why not real races, started in race horse style and run in heats? The running of a so-called scattering lap as was attempted at Cleveland does not fill the bill with public or pilots.

I would like to call to your attention the fact that in 1925 at Battle Creek, Michigan, a three day air meet was held with 53 competing contesting planes. An application was made for an N.A.A. sanction for this meet, but as their own prepared rules called for race horse starting with five planes in a heat, starting from standstill, and running a five mile triangular course, it was deemed too dangerous and so the meet went forward as planned without a sanction. During the three days, 27 racing heats were run successfully, my own plane participating.

In all the races and contests handled in this manner there has never been any damage to equipment or injury to personnel.

R. E. LEWIS,
Battle Creek, Michigan.

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A Neglected City

TO THE EDITOR:

We feel that San Diego has been seriously neglected in the matter of air mail and in several other aviation matters. We are writing to bring these matters to your attention and to ask your support in our endeavors to secure proper recognition for San Diego.

San Diego, "The Air Capital of the West," has more aviation activities than any other city in the United States. A survey recently made by this Department reveals that during every day in the year an average of 540 flights are made in San Diego and that these flights average a total of 391 hours in the air daily, covering a distance of 26,720 miles flown daily. These figures do not include the activities of transport companies.

San Diego is served regularly by Maddux Air Lines, Pickwick Airways and Continental Air Express. Frequent special chartered trips are made to San Diego by Western Air Express, Standard Air Lines, Universal Air Lines, Aero Corporation of California and others.

Eight regular scheduled round trips are made daily by transport planes over the San Diego-Los Angeles Airway. An average of six additional round trips daily is made by chartered planes.

These statistics indicate that the San Diego-Los Angeles Airway is the busiest route in the country and that the Ryan Airport at San Diego is the greatest transport and especially international transport airport in the United States.

There are two major items in aviation desired by San Diego. The first is the lighting and equipping with weather stations of the San Diego-Los Angeles Airway. We feel that if it is good business for the Department of Commerce to light such routes as that from Pasco to Salt Lake, a distance of 530 miles with one round trip daily, it is certainly worthwhile to light the San Diego-Los Angeles route, a distance of 115 miles with 14 round trips daily. The proper equipping of this route is urgently necessary for the safe transportation of passengers especially during the winter.

The other matter is the establishment of service over the Southern Air Mail route from Los Angeles to New York via San Diego, Phoenix, Tucson, El Paso, Dallas, Shreveport, Jackson, Birmingham and Atlanta.

This route is declared by all experienced fliers to be the only really safe transcontinental air route. This is the low altitude route and is remarkably free from the hazards encountered on all of the other transcontinental air routes.

A survey made by this Department recently shows conclusively that sufficient air mail poundage is available along this route to warrant its establishment. This route will serve thirty-two million people, ten million of whom now have no air mail service.

We will appreciate having you call these matters to the attention of your readers in hope that we may secure some recognition of San Diego's situation and of the urgent need of immediate attention to the matters mentioned.

THOMAS F. BOMAR,
Manager Aviation Department.
San Diego Chamber of Commerce, San Diego, Calif.

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Private Pilots

TO THE EDITOR:

I agree with nearly everything Mr. Osborn says in his article on the private flyer's problem in the issue of October 19, except his statement that it is necessary for a pilot to fly 200 hours a year in order to retain his efficiency. I believe that a pilot, after he has really learned to fly, can keep himself in condition or rather, keep the "feel" of the air by flying an hour a week.

Mr. Osborn says that "an amateur flier wants a plane which will glide under full control at a much steeper angle than that of the present plane." This is very desirable, but on the other hand, I don't believe any amateur pilot should fly much until he thoroughly understands side-slip-

ping, forward-slipping, and fish-tailing. Hours should be spent on this sort of thing under a competent instructor until it becomes second nature. I think also, that almost all the amateur pilot's landings should be made with these maneuvers so that he becomes so familiar with them that he feels no fear. As you know, they are not difficult to learn and are mighty important when one is making a forced landing in a small field.

I agree with the last paragraph of Mr. Osborn's article in which he says that it will be a long time before amateur flying will be out of the motor boat class. This means, of course, that new ships will have to be designed also.

MERRILL C. MEIGS,
208 South La Salle St., Chicago, Ill.

Editorial Comment
FROM THE DAILY PRESS

Saving the Relics

COLLECTING famous airplanes seems to have become one of the latest museum fads. Col. Lindbergh's "Spirit of St. Louis" rests in its last hangar at the Smithsonian Institute, in Washington. The "Bremen," first east-west Atlantic plane, is museumized in New York. Now, Col. Arthur Goebel's Dole-flight-winning Hawaii plane is to go into a private museum in Oklahoma.

The faster these planes are stowed away out of active use, the more rapidly will aviation develop. All of them, up-to-date and minutely modern in their day, are already obsolete in many respects. Aviation progresses so rapidly that a crack plane of today quickly becomes a likely-to-crack plane of tomorrow. — SEATTLE (WASH.) TIMES.

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Buying Farms From the Air

RECENTLY the view was expressed in the agricultural department of The Pantagraph that purchasers of farm land have now a new means of forming judgment as to the value of any tract. That is the picture of the farm as it appears from the air.

The idea is something new in a farm real estate, but it is well worth considering.

Of course, no one would advise a practical man to buy any piece of land by simply looking at its picture as taken from airplane. No one would want to own a piece of farm land which might be valueless, no matter how pretty a scene it might present in an aerial photograph.

But after all the ordinary factors of the value of the farm are considered, its soil and adaption for the desired purposes, its location, accessibility to markets, and all that, still there would be some value in the picture of the land taken from a plane, for it would present a view of the tract as a whole, showing not only the land desired but also the adjoining countryside, the roads, woods and natural drainage course.

An example of the kind of aerial picture of land which might be useful was the photograph taken by The Pantagraph plane of a well improved farm near Foosland. This picture reveals the assembly of buildings, their relation to each other and other factors of the improvements on the land which could be gained in no other way.— BLOOMINGTON (ILL.) PANTAGRAPH.

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The Men Who Built the Hangar

IF AN EXPERIENCED BALLOONIST of A. D. 1829 had been told that the day would come when a dirigible balloon 785 feet long would be constructed in the United States he might have replied, "Possibly; but there are difficulties. So big a gas bag would have to be braced from within, and we have no braces light enough for the purpose now. As for power to drive such a monster"—And he would have ended by shaking a dubious head.

But if an experienced architect of 1829 had been told that we should one day build a balloon barn 1,165 feet long, 325 feet wide and 211 feet high, with no obstructing beams or posts, he would have said impolitely, "You're crazy!" Barns for centuries had been built in "bays." You added length by adding bays but did not greatly increase width; nor did obstructing beams disappear until the power hayfork banished them. So in public buildings length was what you had money to pay for, but width or span was limited. Vast as is St. Peter's in Rome, its nave is only seventy-five feet wide. The great Peace Gallery in Versailles, where a German Emperor was crowned in 1871 and the Versailles Treaty was signed in 1919, is but thirty-five feet wide.

It is a great feat to undertake at Akron, O., a bigger airship than has ever yet been launched, the navy's ZRS-4. But airships are well advertised, and the sheds that are to house them, almost equally marvelous, not at all. So here is a word for the men who built a hangar covering more than eight acres of uninterrupted space. That also is something rather remarkable.—NEW YORK WORLD.

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Airmanship Triumphs

WHEN Pilot Jimmy Doles brought his Western Air Express trimotored liner safely to port at Albuquerque, after a twenty-hour delay caused by being forced down temporarily through the fury of a New Mexico snowstorm, he scored a triumph for air travel that is full of promise for all who are looking to more assured safety for those who go up to the skies in ships.

No harder test could have been imposed on the quality both of the pilot and his craft than the experience of the air liner in its fight with the fury of the elements which involved not only landing under the most difficult conditions to which an airplane can be subjected, but taking off again under equally unfavorable handicaps. While all the big air transport companies avoid, as far as is humanly possible, taking risks when weather conditions are reported hazardous, Pilot Doles has demonstrated that should an air liner be caught in an unexpected storm, under skillful handling it can fare as well as would a ship at sea similarly placed. — Los ANGELES TIMES.

Abstracts AND *Reviews*

Airway Development Plea

GOOD ROADS FOR AIRPLANES, *by Graham B. Grosvenor; Paper read Nov. 18, 1929 before the Detroit Section, Society of Automotive Engineers.*

AFTER a brief summary of recent achievements in the field of aviation, President Grosvenor of The Aviation Corporation made a strong plea for government development of airways corresponding to the development of highways for automobiles in the past twenty years. He pointed out the necessity for lighting and intermediate fields on all established airways, recommending intermediate fields every ten miles.

The section of his paper most interesting to the industry was the report of a survey to determine the cost of establishing an ideal airway on the St. Louis-Denver route, a distance of 773 mi. considered typical or average for conditions throughout the United States. On the basis of a requirement

of 68 fields, averaging 160 acres, to supplement the municipal fields already in existence on the route, and acetylene route blinkers at half-mile intervals, the estimated cost was $1,777,940.52, or about $2,300 per mile, not including radio installations. The per mile cost of lighting is given as $732.21.

The figures in detail are as follows: Land for fields, $961,200; ditching and draining, $64,000; procurement, surveying, clearing, grading, $170,000; fencing, $16,320; lighting of 68 fields, $239,780.52; cost of primary connections or electrical generating units, $20,400; acetylene route blinkers, $292,320; one-year leases of plots for blinkers, $13,920. Annual maintenance costs are estimated at $247,360, or about $320 per mile.

On the basis of this estimate, it would cost about $40,000,000 to install lighting equipment and intermediate fields for existing airways not so provided at present. Mr. Grosvenor frankly admitted that such an expenditure could not be expected immediately, but asked that it should be kept as an ideal, emphasizing the desirability of co-operation between state and federal governments following the precedent of road-building.

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Cantilever Wings

CANTILEVER WINGS FOR MODERN AIRCRAFT. *By H. J. Stieger, from Aircraft Engineering; N.A.C.A. Technical Memorandum No. 538.*

THE AUTHOR of the above paper believes that bias is shifting towards the monoplane because the knowledge, with regard to methods for obtaining torsional stiffness in structure has grown, rapidly, and unmistakably. Lack of stiffness, and necessity of making the cantilever wing thick and heavy, has been one continuous drawback for this type of construction.

To obtain a torsional stiff cantilever wing it is necessary for the designer to employ interspar braces, metal wing covering, or various other means all of which add weight and make the construction undesirable. Many have departed from the orthodox two-spar type, and used a multi-spar system. In this case, however, the spars had to be considerably thinner and consequently required a greater amount of bracing to obtain the proper amount of stiffness. The result was excessively heavy wings.

The third possible system of cantilever wing construction is the mono-spar. In this case a unique system of bracing has been evolved which gives complete satisfaction for torsional rigidity. The mono-spar construction is about 60% as heavy as the two-spar and is equally as strong in every respect. To emphasize the weight saving effect of this system, the author of the above paper quotes figures from W. S. Farren's lecture, showing that if a Fokker F. VII 3M. were converted into a mono-spar wing the increase in pay load would be 30.6 per cent. A similar change for an Argosy would bring an increase of 32 per cent.

In construction the mono-spar is very simple. A single spar of sufficient depth is placed in the thickest section of the wing. Tension wires connected to the spar and to the drag and antidrag members form "pyramids" which spiral around and along the spar. These transmit the torsion and drag loads to the spar and at the same time stabilize it. The ribs, constituting the secondary structure, are fastened to the main spar and are supported at the leading edge by the drag member and at the trailing edge (embracing about 60 per cent of the chord length) by the antidrag member. The structure is quite robust and has a number of features to its advantage.

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Fog and Blind Flying

SOLVING THE PROBLEM OF FOG FLYING; *Published in pamphlet form by The Daniel Guggenheim Fund for the Promotion of Aeronautics, Inc., New York City, Oct., 1929.*

SUBSEQUENT to the successful flight by Lieut. James Doolittle Sept. 24 in a plane with the cockpit completely covered over, a full report of the activities to date of the Daniel Guggenheim Fund, in connection with the problems of fog and blind flying, has been published. These activities began with the organization, in September, 1926, of a committee consist- Jr., to coordinate the work of CMCM ing of Harry F. Guggenheim, F. Trubee Davison, Edward P. Warner, and William P. MacCracken, Jr., to coordinate the work of the Fund in this field. The problems were divided by this committee under five general headings: (1) Dissipation of fog; (2) Development of instruments to locate flying fields; (3) Development of altimeters showing height above the ground; (4) Improvement of other instruments for fog flying; (5) Fog penetration by light rays.

Work has been carried on, or encouraged with financial assistance from the Fund, along each of the lines indicated. For its own research, the Fund obtained two planes, a Consolidated NY2 and a Vought O2U-1. Most of the experiments were carried on with the Consolidated plane, which was fitted with a special radio telephone transmitter and receiver developed by the Bell Laboratories, as well as with unusually rugged oleo shock absorbers for the landing gear, special crash net for the rear cockpit, ice warning thermometer, etc.

The most important instrument specially developed as a result of the experiments is an artifical horizon, or altitude indicator, which will soon be placed in production by the Sperry Gyroscope Company. It was developed at the suggestion of Lieutenant Doolittle, who had tested two German instruments of similar purpose and found them not entirely satisfactory. Improvement of various types of compasses has also received much attention, and the fund has cooperated with both the Sperry Company and the Pioneer Instrument Company in the hope of obtaining a more satisfactory instrument. This work is being continued.

Other devices and suggestions for measuring relative speed and for determining the position of aircraft have been examined, but none of them has been found to be near practical perfection as yet, and with the exception of the instruments mentioned above, the use of radio for guiding planes was the subject of most extensive experimentation. In general, the experimenters were more concerned with analyzing and suggesting corrections for difficulties with apparatus already in use, than with innovations. Indications are that the objections to the general use of radio beacons will have been overcome very soon. The substitution of visible vibrating reeds for headphones has been a decided improvement, and the use of radio bearings in various forms also offers promising possibilities. Determination of an aircraft's position by triangulation between ground stations is already in fairly successful operation in Europe.

Radio does not seem to offer much hope, however, for aid in actual landings in fog, and the development of more sensitive altimeters giving distance from the ground rather than above sea level is of the utmost importance. Sound, light and radio devices for this purpose are under consideration, particularly by the Submarine Signal Company of Boston. The Fund is also assisting experiments on acoustic altimeters by Professor Delsasso of the University of California, and Mr. Kaupa at the University of Delft, Holland.

It seems to have been the general idea of the administrators of the Fund to devote their attention mainly to research in fundamentals, in the belief that if certain guiding principles are discovered, commercial companies can safely be relied upon to apply them. Accordingly, the study of fog penetration has thus far been confined to experiments with a view to determining the most suitable light, radio, electromagnetic or sound waves for use, and no apparatus for applying them practically has been attempted. It is pointed out that work by Dr. Stratton of the Massachusetts Institute of Technology indicates the need for waves of about half a centimeter in length, whereas the shortest radio waves as yet produced are about twelve centimeters long.

Four methods of dissipating fogs have been suggested, which can be roughly described as mechanical, chemical, electrical and thermal. All of them have been demonstrated satisfactorily on a small scale, but all would seem

too expensive for general use, particularly if the fog were accompanied by wind. It is indicated that something may be done, however, to remove artificial conditions tending to produce fogs over cities and manufacturing districts.

Other problems, such as the prevention of ice formation, automatic warning of the danger of collision, and the use of so-called automatic pilots, have been studied under the auspices of the Fund and with the aid of Lieutenant Doolittle and the flying laboratory. Devices thus far tried have not been entirely satisfactory, but have seemed to indicate that the problems are far from insoluble. [It is particularly interesting to note, incidentally, that demonstrations since the pamphlet was published point to the practicability of automatic pilots, whereas the report inclined to the point of view that inherent stability of planes, even with some sacrifice of maneuverability, was more likely to produce the desired results.—Ed.]

As a whole, the pamphlet is interesting as an exposition of work in progress rather than for its record of completed achievements to date. The most important work of the Fund in connection with the problems of fog flying is in testing and coordinating devices which have been produced by many different persons or companies, and in giving occasional demonstrations of their collective possibilities such as was afforded by Lieut. Doolittle's famous "blind flight" in September. This not only helps to prevent duplication of effort, but also tends to reduce appreciably the time which must elapse before we can look for a complete solution of the various questions involved. In many cases, as has been noted, experimentation is expedited by direct financial assistance.

New Patents

Helicopter

1,735,872. AIRPLANE HELICOPTER. WALTER I. O'NEILL, New York, N. Y. Filed May 2, 1928. Serial No. 274,387. 8 Claims. Cl. 244—14.)

THE WING of an airplane supports the engines and is pivotally mounted on braces fixed to the fuselage so that it may be rotated about an athwartship axis. The object of this construction is to permit the wing and its engines to be tilted to assist in rising and landing. The rotation of the wing is effected by the pilot through a handle which operates a gear connection to a cylinder carried by the wing and journaled in the braces. Provision is made through a system of gears and pulleys for taking up the slack in the control cables when the wing is tilted.

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Extensible Wings

1,736,300. AIRPLANE. EDWARD BURKE WILFORD, Merion, Pa., assignor of one-half to John S. Wilford, Philadelphia, Pa. Filed Dec. 13, 1927. Serial No. 239,769. 3 Claims. (Cl. 244—12.)

THE USUAL FIXED WINGS of an airplane are provided with extensible portions at their outer ends to increase the lift area, with pivoted portions at their rear edges to vary the camber, and with extensible portions at the rear edges of the pivoted portions for further increasing the lift area. Provision is made for performing all of these operations simultaneously with the object of facilitating starting and landing. A single shaft controlled by the pilot has cable connections with the wing-end extensions, and gear connections with the pivoted portions. During the adjustment of these portions, their rear extensions are designed to be drawn in and out by reason of their connection with a fixed inclined track.

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Landing Gear

1,735,852. LANDING GEAR FOR AIRPLANES. ELLIOT DALAND, Torresdale, Pa., assignor to Keystone Aircraft Corporation, Bristol, Pa., a Corporation of Delaware. Filed Aug. 16, 1928. Serial No. 300,088. 10 Claims. (Cl. 244—2.)

THE SUPPORTING FRAME of the landing gear is connected to the airplane body through a shock-absorbing cylinder designed to absorb the vertical landing thrusts. Struts are provided between the gear frame and the airplane body to take up rear and side thrusts. The struts are connected to the body by pins permitting pivotal movement. The whole landing gear, excepting the struts, is enclosed in a stream-line casing.

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Supports for Wing Tips

1,736,226. AEROPLANE. RICHARD V. SPENCER, Los Angeles, Calif. Filed July 22, 1929. Serial No. 380,085. 4 Claims. (Cl. 244—2.)

SUPPORTS for the wing tips of airplanes to prevent dragging of the ends on the ground. A frame carrying a wheel is pivoted near the end of each wing and is designed to be swung at the will of the pilot to working position or to retracted position. For this purpose a link is connected to each frame and to one end of a rod whose other end is screw-threaded into a member designed to be rotated by the engine. A clutch is provided for the purpose of enabling the pilot to control the connection of the member to the engine, as well as its direction of rotation. An air dash-pot is formed between each wheel and its frame for absorbing shocks.

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Wind Cone

1,736,109. WIND CONE. JAMES S. BARTON, Hollywood, Calif. Filed April 10, 1929. Serial No. 354,080. 6 Claims. (Cl. 116—174.)

THE USUAL WIND-CONE for indicating the direction of the wind is provided with a fin or rudder at its open end designed to hold this end pointed into the wind and maintain the cone in filled condition. The cone is attached to one side of the fin whose other side is pivoted on the usual tower.

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Propeller Guard

1,735,912. PROPELLER GUARD. GRIFFIN C. THRIFT, Houston, Tex. Filed Oct. 4, 1926. Serial No. 139,371. 6 Claims. (Cl. 170—177.)

THE HUB for mounting the propeller on the engine shaft comprises two spaced members between which the propeller blades are clamped, one of the members being fixed to the shaft. The other member is formed with bearings upon which is rotatably mounted a guard which is formed with a front knob or hand-rest designed to be grasped by the operator while spinning the propeller.

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Sky Writing

1,736,516. SKY WRITING. RICHARD DOUGLAS BAILEY and DORIAN BAILEY, Seaforth, England. Filed Dec. 8, 1923. Serial No. 679,359½, and in Great Britain Jan. 1, 1923. 8 Claims. (Cl. 244—1.)

INSTEAD OF maneuvering a smoke-emitting airplane to form letters or other symbols, this invention proposes to fire a group of cartridges or fuses from an airplane traveling a straight course. The cartridges or fuses are so arranged relative to each other in firing position on the airplane that when fired the flaming masses are intended to form the desired letter or symbol.

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Propeller for Dirigible Craft

1,736,632. AIRPLANE. EUGENE SCHMIDT, St. Paul, Minn. Filed April 25, 1928. Serial No. 272,713. 2 Claims. (Cl. 244—16.)

A WIND-MILL or paddle type of propeller having flat blades is provided in place of the usual screw-type propeller. A baffle or wind-break is positioned in advance of the forward moving blades so that these blades will not have to overcome head-wind resistance.

SIDE SLIPS

By
Robert R. Osborn

MR. H. H. F. JR. stopped in to comment on the accident to the plane owned by Mr. Richard Hoyt, which was left parked in a pasture somewhere, and was found to have its rudder chewed off by a cow or horse or something when the party returned for it. H. H. F. Jr. thinks that the airplane of the future will not only have to be amphibious but carnivorous, so that it can bite back if attacked while its owner is away.

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If airplane tails are as indigestible as we think they must be, we'll bet the cow that ate that rudder went into one of those "deadly tail spins" in a very short time after lunch.

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We see by the papers that Philadelphia is trying to obtain the use of Hog Island for a municipal airport development. We quote from the New York *Times*, Mayor Mackey's listing of the advantages of the location for the new airport— " 'It will provide for the benefit of the whole metropolitan area embraced in the Port of Philadelphia,' the Mayor said, 'a terminal which will be unique in the world, in that it combines in one place the essentials for a meeting of all of the major methods of transportation. . . . Marine transportation on a thirty-five foot channel to the sea; rail transportation direct whereby shipments may be made between tidewater and any point in the country, motor-truck transportation by cement roads connecting with the Lincoln highway, supplemented by the newest developing system of transportation, air transportation, with facilities for all three of its divisions, airplane, seaplane and dirigible.' "

This sounds all very well, but it is evident that the Mayor doesn't read Will Rogers, and is therefore ignorant of all of the requirements of a modern airport. Where, we want to know, is the high tension electric line which must surround the field on at least three sides?

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Mr. R.A.S. of New York sends in a clipping from the New York *Times* which refers to a "*Whirlwing* Cessna" with the comment that he shouldn't think such a ship would be very good for photographic work.

We're not so sure, think of the swell panoramic pictures one could get.

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Mr. T. S. of Frazer, Montana, has loaned us an extremely interesting magazine—the *Aeronautical World*, issue of November 1, 1902, published at Glenville, Ohio. One item therein has a strangely familiar sound, and with a little modernizing would make an excellent editorial for almost any aeronautical magazine:

"BALLOON ASCENSION RISKS

"The prevalent idea is that the sport of ballooning is attended with great risk, but in spite of the fact that several aeronauts have recently met with fatal accidents, it is not more hazardous than cycling. Out of 600 ascents made from Paris during the exhibition not a single accident occurred. Almost every newspaper published record balloon accidents, but only local newspapers mention deaths due to cycles."

• • •

Another item in the *Aeronautical World* explains why the dirigible balloon never amounted to anything, and should serve as a warning to Dr. Eckener and the designer of the new British ships to start exhibiting their dirigibles at fairs before they have to face the serious charge of fooling the public:

"THE DIRIGIBLE BALLOON

"Does the fragile dirigible balloon, which depends on calm and fair weather, promise in the future a practical everyday means of rapid transit, in every direction, in all weathers? What is the prospect of their ever being made to overcome and withstand the wind and pressure of the atmosphere when driven, say, 25 miles an hour? A contemporary says they are simply toys for the gale to play with and devices with which to fool the public. He thinks they make the best attraction out for fairs, but believes it will greatly retard progress in the practical solution of the problem of flight.

• • •

"Long Island City Court today heard its first charge of airplane theft argued, and at the conclusion J. E. Owens, Eckford Hodgson and John Warren were held in $2,000 bail each, while the case was adjourned for thirty days by Magistrate Marvin. Because Owens, as pilot, and Hodgson and Warren as passengers, flew north from Raleigh, N. C., in the "City of Savannah," a monoplane of the Eastern Air Express, violating what the sheriff of Wayne County says was an attachment placed on the plane, they are accused of grand larceny and the use of a deadly weapon." Item from the New York *Evening Post* sent in by D.H.B. of Floral Park, N. Y.

• • •

If we were one of the accused aeronauts we would set up the defense that we thought the legal attachment was like most other attachments on an airplane, and therefore would rattle loose and fall off after a few hours in the air.

The Intrepid Aviator says he thinks that the charge of using a deadly weapon is a good one, and in the case of his Jenny, one never knows when it is loaded. He says, too, that he understands the ship was flown away from its place of impoundment after dark, and therefore the charge against the pilot should be one of concealed deadly weapons.

• • •

We have the following bitter comments on life from G. A. W., whose identity we shall not reveal except to mention that he is connected with George A. Wies, Inc. of Roosevelt Field: "Here is one for you,—and out of AVIATION at that. They's some planes, them Sokkers."

"For Sale, One used Sokker, B. M. W. motor, good condition, George A. Wies, Inc., Roosevelt Field No. 2, Garden City, N. Y."

• • •

A newspaper announcement of the arrival in New York of the treasurer of the International Society for the Exploration of the Arctic by Means of Aircraft clears up a mystery which has been bothering us for some time. We were wondering what sort of titles the officers of a society with a flossy name like that would have. Here, you know, we have societies with simple names such as Elks, Moose and Masons, with officers having titles such as Past Imperial Supreme Eminent Grand Kleagle and Glorious, Superheterodyne Hot-and-Cold-Running-Water Exalted Ruler Masters. In Germany the procedure is apparently reversed, the society having all of the frosting.

BY NICHOLAS-BEAZLEY AIRPLANE COMPANY, INC.

The Barling NB-3 is the safest light airplane. Superior engineering gives unexcelled stability and ease in handling. It flies hands off—almost continuously if desired.

It automatically rights itself in flight from any position —in any maneuver—upon release of the controls.

Non-spinning—will not fall into a spin from any stall position. Although many expert pilots have tried, no one has been able to force it into and hold it in a continuous spin. Vision—is the maximum, as perfect and complete as can be devised in a plane.

Slow landing, quick take-off and rapid climb for restricted landings—excelling most planes with twice the power.

Full cantilever wing—not divided at the fuselage—unbreakable—no external wires, struts or bracing to loosen, break or adjust. A thick metal wing below the fuselage to protect the occupants in a severe landing.

Center of gravity—lowest of any design. Easier to taxi, better control in cross wind, prevents nose overs.

The only low wing metal airplane—with many exclusive engineering advantages—and a wing loading of only 8.6 pounds per square foot.

Metal uniform in strength—avoids the irregularities and uncertain resistance of wood. Bends or deforms in case of accident instead of splintering and breaking.

All parts are uniform—standardized, pressed or stamped with special machinery and dies eliminating the hazards of hand labor.

Assembling is done to jigs and fixtures insuring uniformity and full protection of every factor of safety.

NICHOLAS-BEAZLEY AIRPLANE COMPANY, Inc.
MANUFACTURING DIVISION—MARSHALL, MISSOURI

The most saleable and desirable small plane sales agency account.

A plane with originality, distinctiveness, many exclusive features and outstanding performance.

The lowest priced per person of any size or type of plane available.

The lowest maintenance cost of any three-place plane.

Sales territory is being contracted.

AH

BARLING NB 3

Monoplane

Are you contemplating the purchase of a single-engined cabin plane for 1930?

Consider the Official Results of the Fifth Annual Ford Reliability Tour!

CONDENSED OFFICIAL RESULTS OF 1929 NATIONAL AIR TOUR

Single-engined Cabin Planes Only

Position at Finish Among All Types	Make of Plane	Seating Capacity	Pilot	Make of Engine	D. of C. Max. Allow. Gross Load (lbs.)	Useful Load (lbs.)	Stick Time (secs.)	Unstick Time (secs.)	Maximum Speed (m.p.h.)	Figure of Merit (points)	*Average Speed Made Good (m.p.h.)	Score (points)
5th	**Bellanca**	**6**	**Capt. Geo. Haldeman**	**Wright J-6 300 h.p.**	**4,600**	**2,310**	**9.1**	**11.5**	**141.56**	**1,044.85**	**132.4**	**33,277.40**
6th	**Bellanca**	**6**	**R. A. Nagle**	**Wright J-6 300 h.p.**	**4,075**	**1,797**	**6.5**	**9.7**	**143.71**	**1,022.64**	**125.0**	**31,090.22**
11th	Cessna	6	Stanley Stanton	Wright J-6 225 h.p.	3,100	1,229	7.1	9.7	145.51	892.70	131.7	27,759.84
12th	Curtiss-Thrush	6	Dale Jackson	Wright J-6 225 h.p.	3,800	1,540	7.2	9.8	113.88	865.60	114.6	27,699.20
13th	Cessna	4	Earl Rowland / J. Meehan	Warner 110 h.p.	2,260	1,035	5.0	12.6	131.48	1,067.75	44.4	27,664.36
14th	Cessna	6	Steve Lacey	Wright J-6 300 h.p.	3,180	1,248	8.3	7.0	152.15	873.34	136.2	26,810.36
15th	Fairchild	7	Richard Pears	P & W Wasp 420 h.p.	5,500	2,570	6.9	13.7	130.06	725.08	120.4	22,566.02
17th	Lockheed	7	Wiley Post	P & W Wasp 420 h.p.	4,265	1,775	11.0	10.4	160.35	665.93	145.4	21,073.39
18th	Curtiss-Thrush	6	J. L. McGrady	Wright J-6 225 h.p.	3,800	1,540	11.6	10.8	120.32	738.16	53.9	20,272.95
19th	Ryan	6	Russell Young	Wright J-6 300 h.p.	4,000	1,749	10.7	11.1	126.80	691.31	59.6	19,929.49
22nd	Curtiss-Robin	3	Gentry Sheldon	Curtiss Challenger 170 h.p.	2,600	962	8.2	9.3	100.30	597.09	108.0	18,967.99
24th	Travel Air	6	Newman Wadlow	Wright J-6 300 h.p.	4,315	1,488	12.1	11.3	125.78	553.18	100.1	14,740.77

*Average speed made good is calculated on total elapsed time between controls over entire tour.

THE figure of merit for each contestant in the Ford Reliability Tour was determined on the formula:

The Bellanca victory of the Cleveland Races was repeated by that of the Ford Tour. In the official tests made at Detroit, the BELLANCA *Pacemaker* carried its full useful load of 1,707 lbs., with

*Average speed made good is calculated on total elapsed time between controls over entire tour.

THE figure of merit for each contestant in the Ford Reliability Tour was determined on the formula:

$$\frac{\text{USEFUL LOAD}}{\text{Unstick + ½ stick}} \times \text{maximum speed} \times \frac{50}{\text{Cubic inch displacement of engine}}$$

Maximum Dept. of Commerce

which, translated into English, means that an airplane will have the highest merit points which will—

take the heaviest load in and out of the smallest field —will fly the fastest with that load—and will do all this with the least horse-power!

Study the Official Results printed above, and you will see that compared with all other single-engined cabin planes the BELLANCA is 20% to 126% more efficient. That means the BELLANCA six-place cabin monoplane, the *Pacemaker*, can carry its amazingly heavy load at a far lower cost than any other cabin airplane represented.

The Bellanca victory of the Cleveland Races was repeated by that of the Ford Tour. In the official tests made at Detroit, the BELLANCA *Pacemaker* carried its full useful load of 1,797 lbs., with a speed of 143.71 m.p.h., a take off of 9.7 seconds, and a landing of 6.5 seconds. Carrying 2,310 lbs. useful load, *equivalent to full tanks and TEN people*, the BELLANCA Freighter (a stock-model *Pacemaker* with large freight or mail compartment) showed in speed 141.56 m.p.h., take-off of 11.5 seconds and landing of 9.1 seconds. And at that, these Bellanca tests were run at the last moment in a dead calm, though a wind of 6 to 10 m.p.h. had favored the other contestants.

And then . . . over the entire tour, a grueling grind of almost 5,000 miles, the official results show Bellanca *among the three highest speeds* of the contest *regardless of types* . . . two Bellanca monoplanes far ahead of all other single-engined cabin planes, *in which class they finished first and second* . . . two Bellancas the only single-engined cabin planes among the first ten "in the money" . . . 5,000 miles of competitive touring at an average speed of 132.4 m.p.h.

Does either the BELLANCA *Pacemaker* or the 300 h.p. Wright Whirlwind Nine Engine need any further demonstration in proof of leadership?

We have completed an analysis of the tour, with particular reference to single-engined cabin planes, copy of which will be mailed anywhere in the world upon receipt of written or wired request.

Bellanca Aircraft Corporation
New Castle, Delaware, U. S. A.
Cable address: Bellanca

BELLANCA

AIRCRAFT ENGINE PARTS

XLO

PARTIAL LIST OF PARTS

Piston Pins • Wrist Pins • Link Pins • Cam Rollers • Cam Followers • Tappet Guides • Valve Guides • Spacers • Thrust Washers • Dowel Pins • Valve Seats • Special Bolts and Screws Milled Thread Studs • Valve Stem Collars • Cylinder Studs Crankcase Studs • Propeller Hub Cones • Propeller Hub Nuts Tachometer Drive Shafts • Auxiliary Drive Shafts • Cylinder Barrels • Crank Cases • Pistons

All Parts Made to Manufacturer's Specifications

1226 Oakman Boulevard
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EX-CELL-O
Aircraft XLO *& Tool*
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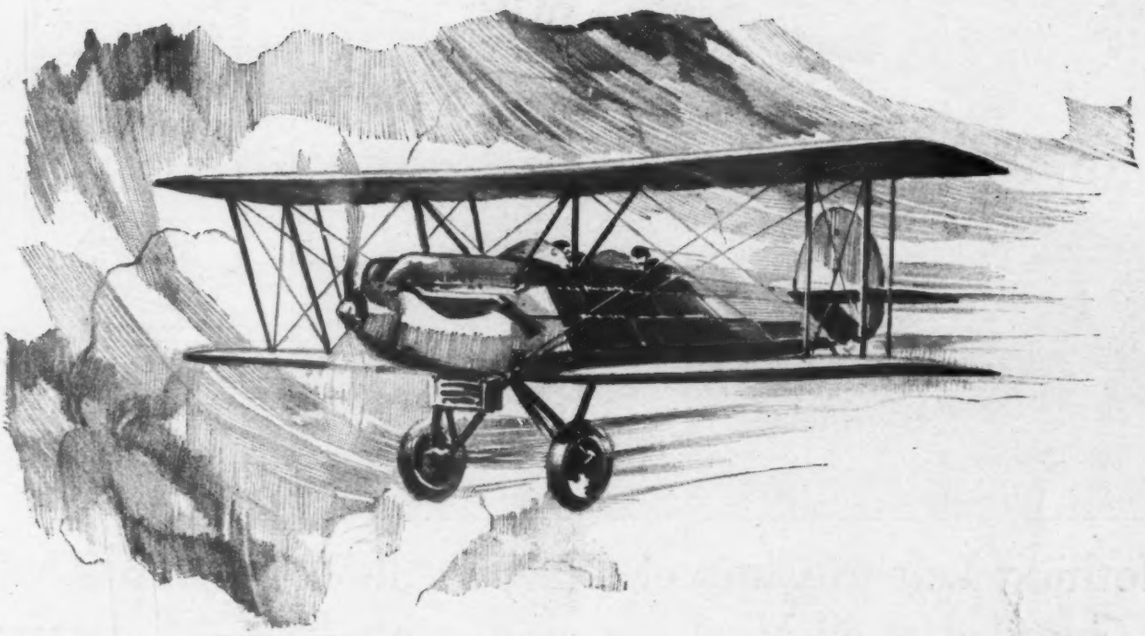
The

PARKS TRAINER



STANDARD TRAINING PLANE AT AMERICA'S LARGEST AIR COLLEGE

Standard training plane at the Parks Air College — largest and finest in America — the Parks Trainer is now available to independent flying school operators and to all sportsmen. Especially adapted to student instruction—ideally designed for private pilots—it is the foremost plane of its class on the market today.

Built by a division of the Detroit Aircraft Corporation, the Parks Trainer is backed by an organization which holds a position of acknowledged leadership in the industry. In design and performance it is recognized today as the most satisfactory type of training and sport plane.

Such outstanding features as inherent stability and amazing maneuverability—exceedingly low landing speed and 90 m. p. h. cruising speed — together with positive flight control are a few of the many superiorities of the Parks Trainer.

The Parks Trainer—equipped with an OX-5 engine—is priced at $3,165. For greater horsepower requirements, the Parks is offered with an Axelson 150 h. p. engine at $6,000 and with a Wright J-6, 165 h. p. at $6,350. Our illustrated folder containing complete details will gladly be sent upon request.

PARKS

PARKS AIRCRAFT CORPORATION . . . . . Detroit, Michigan

DIVISION OF

DETROIT AIRCRAFT CORPORATION . . . . Union Trust Building, Detroit

ANOTHER ONE OF THE 65 MANUFACTURERS IN THE AVIATION INDUSTRY THAT USES SKF BEARINGS

Detroit Aircraft Corporation

YOU MAY BUY A BEARING AS A BARGAIN BUT TRY AND GET A BARGAIN OUT OF USING IT

for

Nothing is apt to cost so much as a bearing that cost so little.

SKF Puts the Right Bearing in the Right Place

Nothing Left to Chance! Navy's All-Metal Ship ZMC.2 is Guarded at all Vital Locations with SKF Bearings

THE successful performance of the U. S. Navy all-metal dirigible ZMC-2, marks a new milestone in the development of aircraft. Years of intensive and rigid research and experimentation preceded the practical application of this radical design. Nothing was left to chance. That's why you will find SKF Bearings in the two Wright motors and 36 more on the fin rudders, forward air scoops and hand blower.

It can safely be said that in this remarkable lighter than air craft, SKF bears a tremendous responsibility for the safe navigation of the ship for they are used in every vital location. Such dependence has most certainly not been on the basis of first cost. That was not the consideration in the choice of SKF. Above all things, dependability in the air, was the prime consideration. Where the crucial performance test is applied SKF ranks foremost in anti-friction bearing applications. That's why they are standard with the leaders of the aircraft industry.

SKF INDUSTRIES, INC., 40 East 34th Street, New York, N. Y.

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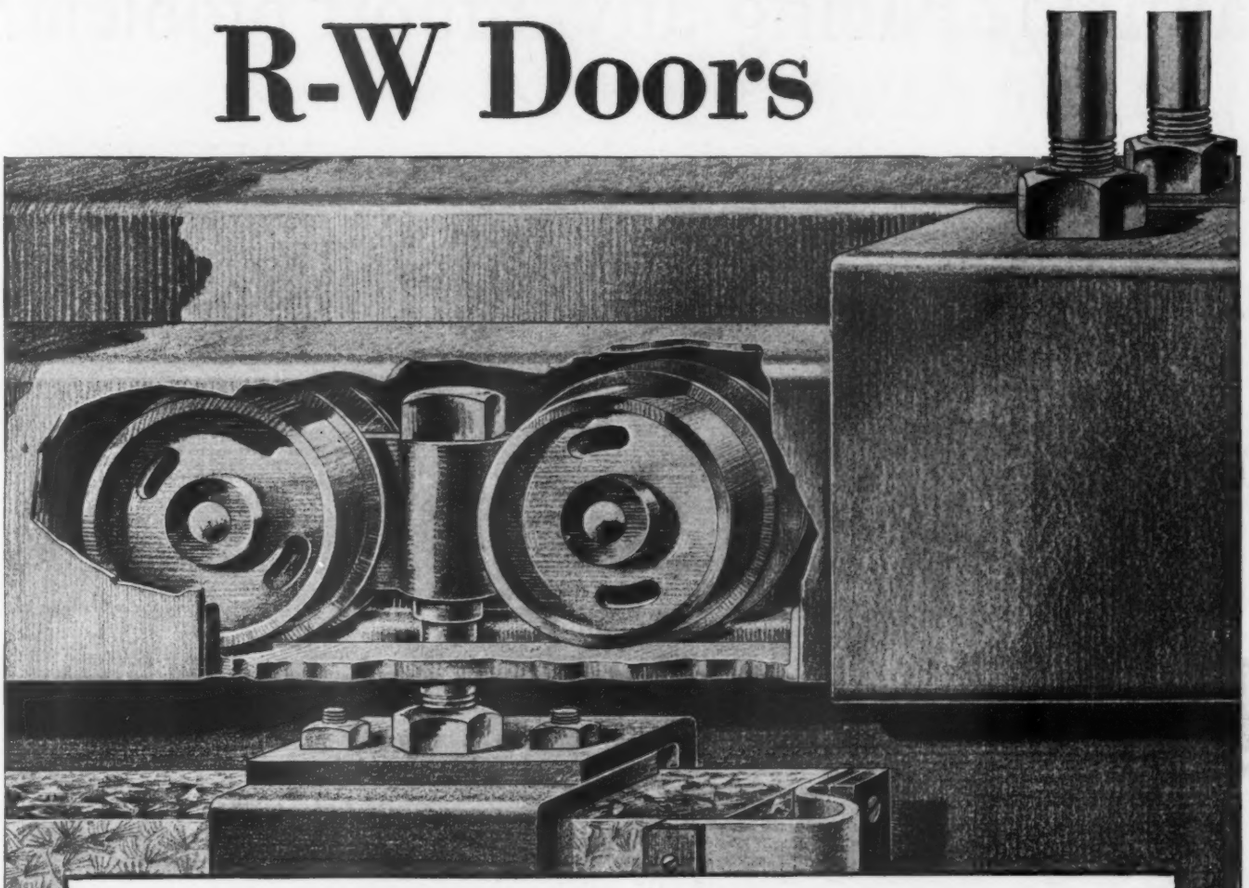
SKF

Ball and Roller Bearings

Sturdy, easy-operating
R-W Doors



Doors—*most important* hangar equipment

You want the sturdiest, easiest-operating hangar doors . . . at a cost in keeping with such service.

R-W doors slide noiselessly around the corner *inside* the hangar. They withstand severe treatment for years, provide every convenience plus economy and safety.

Regardless of the height and width of the opening, any doorway problem can be solved with R-W equipment . . . tin clad, sheet steel or SupeR-Way mill type doors . . . overhead trolley track or floor track, hangers, weatherstrip, bolts and hinges. Richards-Wilcox shoulders responsibility for the complete installation.

Do not hesitate to call one of our branches for free consultation with an R-W engineer, just as you call upon specialists in other phases of your business.

Richards-Wilcox Mfg. Co.

A Hanger for any Door that Slides

New York . . . . AURORA, ILLINOIS, U.S.A. . . . . Chicago
Boston Philadelphia Cleveland Cincinnati Indianapolis St. Louis New Orleans Des Moines
Minneapolis Kansas City Atlanta Los Angeles San Francisco Omaha Seattle Detroit
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Building a hangar? Planning an airfield? Facing any airport problem?

A model hangar at Minneapolis on which Robertson materials were used.

Come to ROBERTSON

LET'S not make any unavoidable mistakes. There is so much yet to be done in this aviation industry . . . so many claims upon every penny of available capital . . . that none of us is justified in repeating experiments that have already failed, or in making mistakes that cost money.

Take hangars, for instance. So many things have already been proven about them that there is no need to make costly experiments. There is no use, for example, to take a chance on unprotected metal roofing or siding for hangars. Do what you will, they will rust away.

There is no use, on the other hand, to sink thousands of dollars into "heavy construction." It costs too much, and moreover it is a dead loss if ever you want to make any changes in your field. For another thing, there is no use ignoring the need for natural daylighting in hangars.

These and hundreds of other problems have been met and solved. The Robertson engineers have participated in all manner of trials and experiments in hangar construction all over the world since before the birth of modern commercial aviation. They know the answers to most of the questions. Let them look over your plans. Their suggestions will cost you nothing and will not obligate you. Just send your blueprints or plans to

H. H. ROBERTSON CO. · PITTSBURGH

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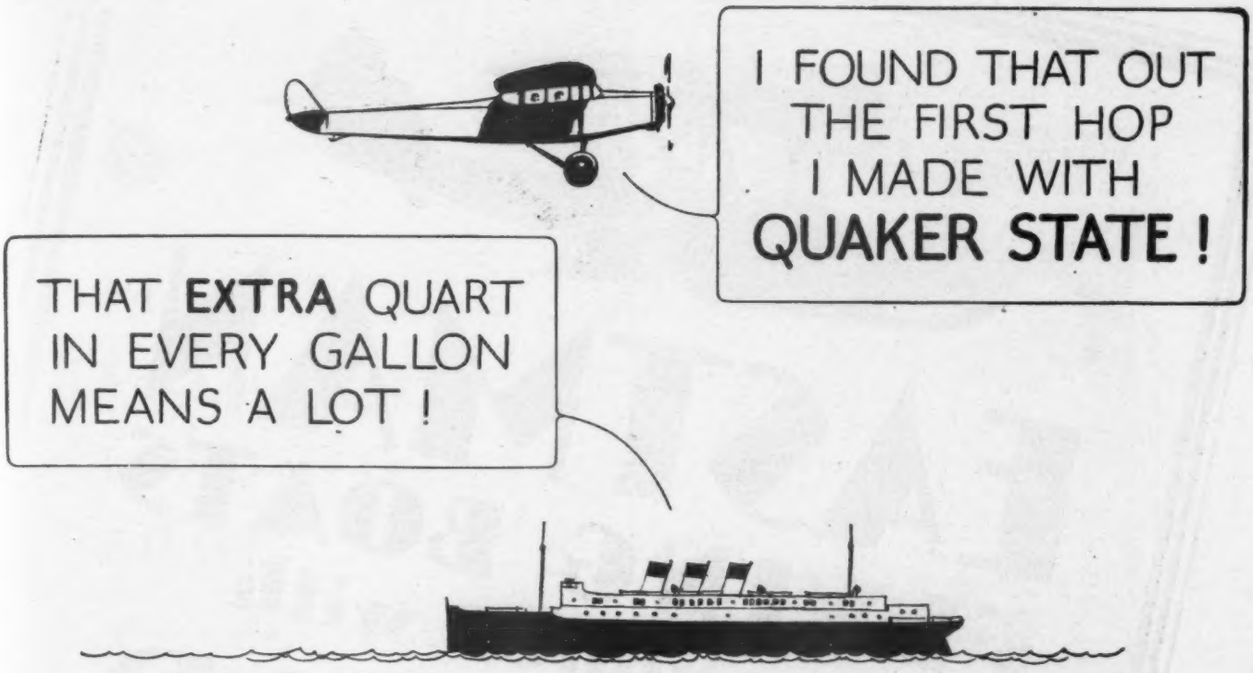
WORLD WIDE BUILDING SERVICE

ROBERTSON *Has the Experience*



GIVE her Quaker State Aero Oil, then give her the gun—and you, too, will find that the *extra* quart in every gallon means a lot!

And what do we mean by an *extra* quart in every gallon of Quaker State? Just this . . .

Ordinary refining leaves in every gallon of oil, a quart or more of material that has little or no value in lubricating an airplane motor—a quart of waste.

But Quaker State Aero Oil is not refined in the ordinary way. It is *super*-refined—carried a step further. And this "extra step" removes the quart of waste that ordinary refining leaves in. In its place you get a quart of *lubricant*—you get an *extra* quart in every gallon of Quaker State!

And all four quarts are made from the very finest crude oil that the world produces . . . 100% pure Pennsylvania Grade Crude . . . the value of which is two or three times that of the crudes from which ordinary oils are made!

Let Quaker State itself prove the difference! Ask for it at your airport, let your motor have it . . . then sit back and enjoy the smoothest, sweetest lubrication you ever found for an airplane motor! Quaker State is sold everywhere—there are over 600 Quaker State distributing warehouses and more than 80,000 Quaker State dealers in the United States and Canada to serve you!

QUAKER STATE AERO OIL

QUAKER STATE OIL REFINING COMPANY

Oil City, Pa.

. . . . . *Other Pure Pennsylvania Products Are:* . . . . . .

QUAKER STATE MEDIUM MOTOR OIL . . . QUAKER STATE COLD TEST
QUAKER STATE HEAVY MOTOR OIL . . . QUAKER STATE TRACTOR OILS

EASTMAN FLYING BOATS equipped with HEYWOOD STARTER

—and now the well known "Eastman Division" of the **Detroit Aircraft Corporation** is equipping their flying boats with Heywood Starters.

Rapidly this starter is becoming the accepted standard equipment unit of the aircraft industry.

How about your product? Should it not also be equipped with this advanced injection starter?

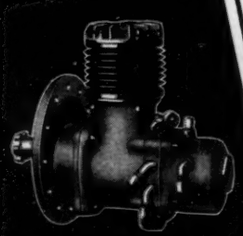
For the Heywood Starter starts instantaneously.

The Heywood Starter has few moving parts.

The Heywood Starter is a marvel of simplicity—both in operation and design.

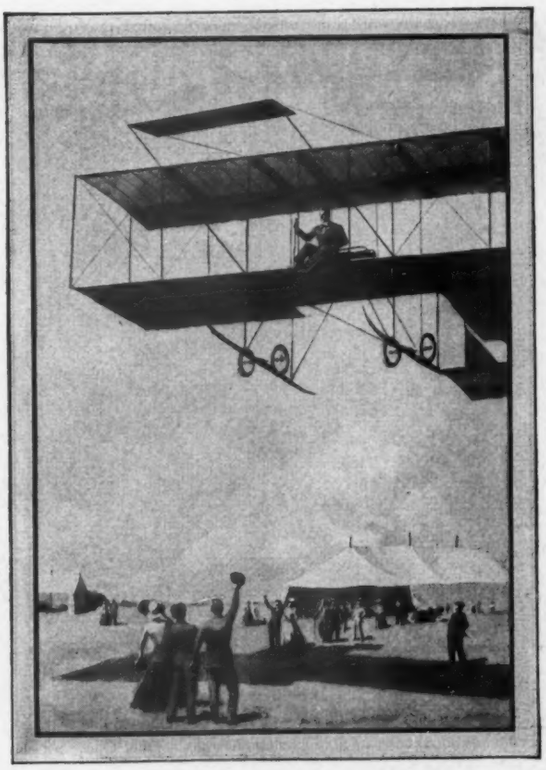
The Heywood Starter is light—dependable—and at all times certain.

Send for complete descriptive matter today.



START-ER *by* HEYWOOD

SKY SPECIALTIES CORPORATION
3651 Hart Avenue · Detroit, Michigan



PILOTS SAT ON THE LEADING EDGE

WHEN U. S. BUILT THE FIRST PNEUMATIC AIRPLANE TIRES

Back in the early days when flying was young — when courageous pioneers piloted their flimsy planes from unprotected seats perched on the leading edge of the lower wing — when flying and flyers were regarded seriously by few — that's when the United States Rubber Company first built pneumatic airplane tires and offered them to the infant industry.

Planes were lighter then and speeds far lower than today's. But then, as now, ground safety depended on the durability and strength of tires. And as requirements grew more exacting — as planes grew heavier and greater speeds were attained — the U. S. Rubber Company continued to pioneer in the development of airplane tires.

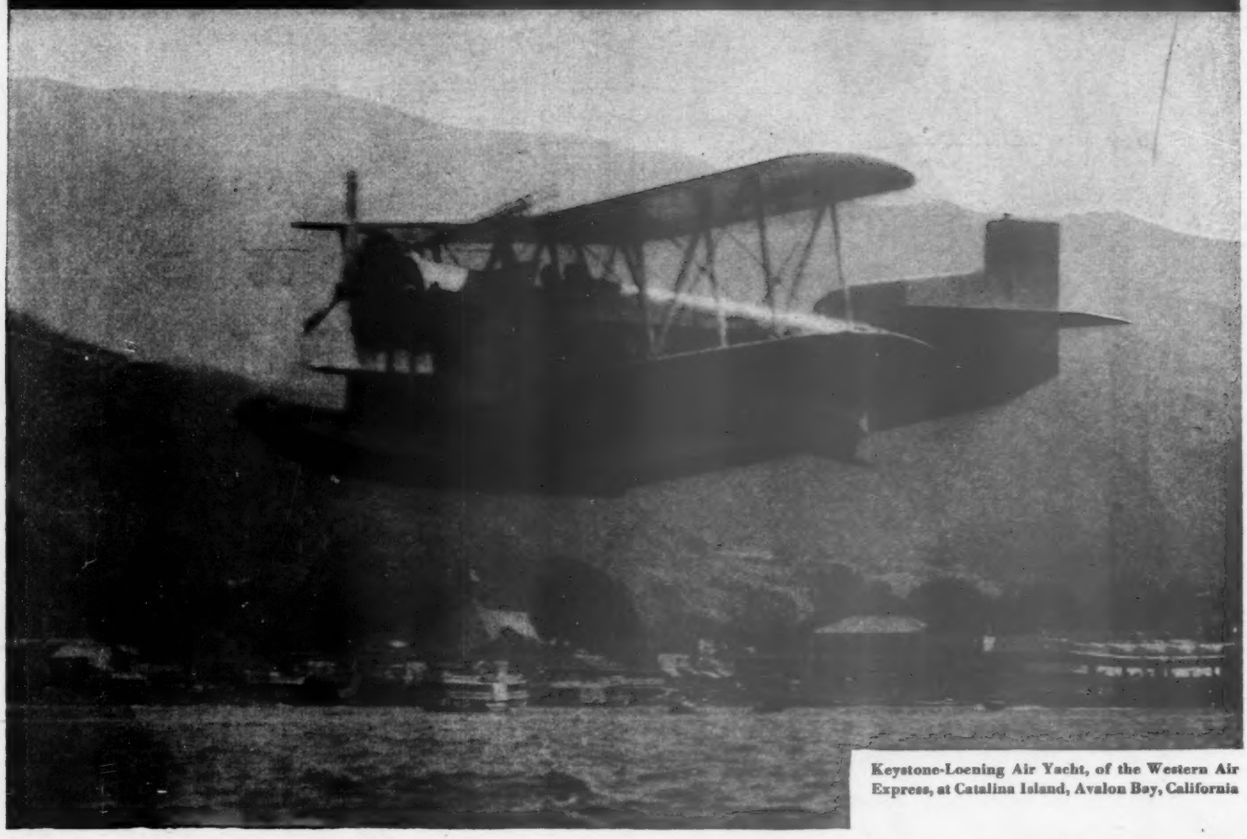
More than 20 years of research and development are behind the modern U. S. airplane tire. There is a complete range of sizes with either plain or non-skid treads. And every tire in the line is of web-cord construction — an exclusive U. S. development which guarantees maximum strength without excessive weight. U. S. Branches are prepared to give immediate service to manufacturers and users everywhere.

UNITED STATES RUBBER COMPANY

Travelair six-place monoplane equipped with United States Tires

UNITED STATES
AIRPLANE
TIRES

KEYSTONE-LOENING AMPHIBIAN "AIR YACHT"



Keystone-Loening Air Yacht, of the Western Air Express, at Catalina Island, Avalon Bay, California

TO CATALINA *via* WESTERN AIR EXPRESS

The "Magic Isle" of Catalina, California's popular pleasure resort, is more popular than ever, now that Keystone-Loening Air Yachts fly there from Los Angeles in the service of Western Air Express. Regular as clock work, these comfortable cabin amphibians maintain schedule on this, the oldest airway passage in the United States. Passengers are whisked over the fifty mile route from Los Angeles Airport to Avalon Harbor in thirty minutes, saving an all-day round trip by way of train and boat.

In the height of the season, as many as seven round trips are made daily, each Air Yacht carrying over five hundred passengers per month. An impressive total of tens of thousands of miles flown, thousands of passengers carried, hundreds of hours in the air for each ship, has been recorded by these dependable amphibians this year, one Air Yacht alone having totaled over 48,000 miles in flight in a six month period. A major transport job has been accomplished at a maintenance cost lower, reports Mr. C. C. Cole, General Superintendent in charge of operations for Western Air Express, "than any other type of amphibian we have operated".

So again do Keystone-Loening Air Yachts prove their worth in daily passenger service. Through their use, an ever-increasing number of representative lines are achieving notable successes in efficient, profitable transportation. We will be glad to confer with interested transport executives regarding the suitability of the Air Yacht for their specific requirements.

6 to 8 passengers : 525 H. P. : 100 M. P. H. Cruising : $27,900

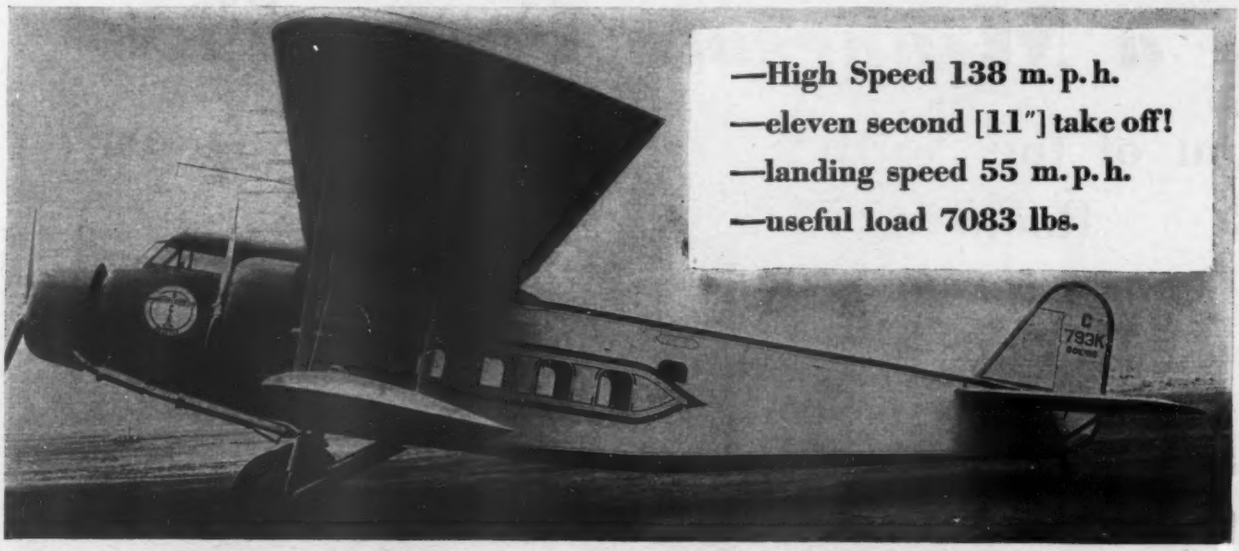
KEYSTONE AIRCRAFT CORPORATION

DIVISION OF

CURTISS-WRIGHT CORPORATION

SALES OFFICES: 27 WEST 57TH STREET, NEW YORK

PERFORMANCE COUNTS!



THE NEW BOEING MODEL 80-A TRI-MOTORED PASSENGER TRANSPORT

BOEING engineers designed Model 80-A to fly on Boeing routes—***not merely an airplane to sell!*** Its specifications were based on two years' flying data gathered on the Boeing-operated Chicago to Oakland route . . .

A fleet of Model 80-A's are now operating on this ***"longest air line in the world"***. . . flying rigid schedules . . . sea level to 12,000 feet . . . some airports 6,800 feet altitude . . . ground temperatures from 30 below zero to 120° Fahrenheit! Tests with full load have proven this transport ***swift, highly maneuverable, economical*** to operate and ***comfortable*** to ride in! It is the outstanding plane in its field.

Model 80-A is now offered to the domestic and foreign market. Complete information will be sent upon request.

BOEING AIRPLANE COMPANY

Division of United Aircraft & Transport Corporation
SEATTLE, WASHINGTON

***PERFORMANCE**

(Boeing Model 80-A with full load)

Speed: High speed 138 m. p. h.; cruising speed 115 m.p.h. Ample reserve power. Cruises 4½ hrs. without refueling.

Quick Take-off; Slow Landing: Takes off in 11 seconds after 750 ft. run(only 1800 ft. run required from field 6200 ft. above sea level). Lands at 55 m.p.h.

Power Plant: Only transport on the market with 3 Pratt & Whitney 525 H.P. "Hornet" engines. N.A.C.A. cowling.

Actual Pay Load: 18 pass., 2 pilots, 1 steward and baggage(4057 lbs.); or 12 passengers and mail.

Radio Equipped: Bonded, shielded and wired throughout.

Fabric Covering: Permits speedy, economical, accurate inspection—a safety factor.

Completely Equipped: No extras to buy, no weight to add.

Comfort Features: Noise-proofed and insulated cabin, 6⅝ ft. high, 5⅛ ft. wide, 19 ft. long. Upholstered, reclining adjustable chairs. Heating and ventilating system. Hot and cold running water. Lavatory large enough to permit shaving. Individual reading lamps. Racks for hats and parcels. A custom-built job with many new refinements and conveniences.

A Robin Helps Fight *a Minnesota Forest Fire*

Out of the North · · · *another story of how the Robin "comes through" in an emergency*

FIRE in the backwoods, fanned by a stiff wind. At the first alarm, a pontoon-equipped Robin skims the smooth surface of a tree-lined Minnesota lake. An aerial fire-fighting crew goes toward an inky black pillar of smoke 4,000 feet high . . . through a thick hot haze into the fire swept regions. Down . . . between a strip of blazing woodland and a wall of smoke, to a landing on a tiny fire-walled lake.

Action aplenty—equipment landed, a quick survey. Back into the Robin for a fast retreat. Out . . . the only way out is up . . . almost straight up. No job for an unstable plane. But the Robin never flinched. Safely back at the base . . . ready for the next test. That's the story of a Robin fire patrol plane, told by Harry Davidson, a Minnesota pilot.

• • •

Under the most hazardous of conditions, a Robin pulls through. Severe tests, unusual demands, and emergency manoeuvers—all in a day's work.

The all-weather, all-purpose Robin can do a first rate job in charter work or student training, or for private use in sport or business.

And remember, behind every Robin there are 40 Curtiss-Wright operating bases and over 100 dealers throughout the country to give you quick and complete service day or night.

TWO REMARKABLE PHOTOS *of the Minnesota forest fires taken from the fire-fighting Robin. Under these day in and day out flying conditions, the Robin pulled through without a trace of trouble. Harry Davidson, the pilot, said "Forest fires raise merry hades with the air," and we can well believe it.*

PILOT HARRY DAVIDSON *and the pontoon-equipped Robin ready to take off at a moment's notice. See the heavy load of fire-fighting apparatus on the pontoon.*

A word from you and complete information about the Robin and the location of the nearest Curtiss base will reach you immediately. At the field you can see it, fly it, and give it every test you want.

CURTISS-ROBERTSON AIRPLANE MANUFACTURING CO.

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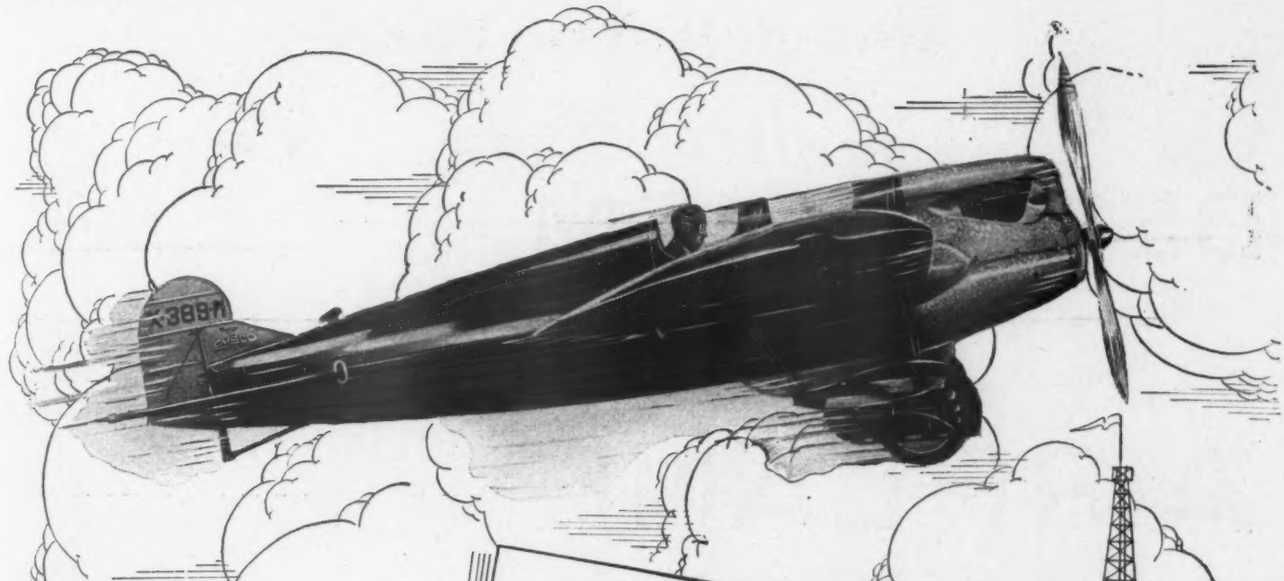

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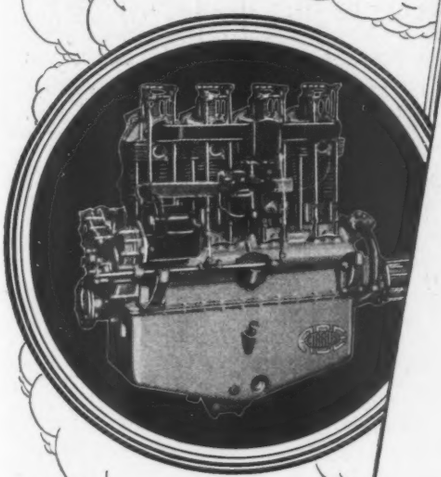

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Oct. 24, 1929

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Yours very truly,
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Advertising Manager.
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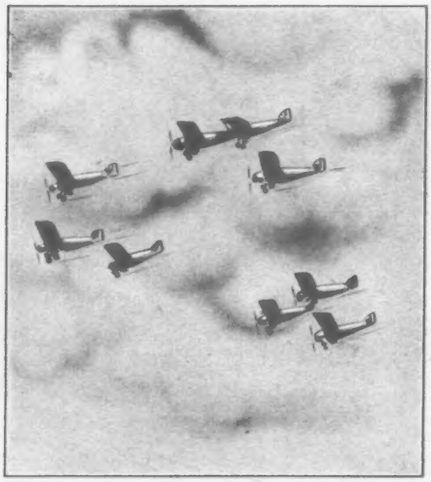

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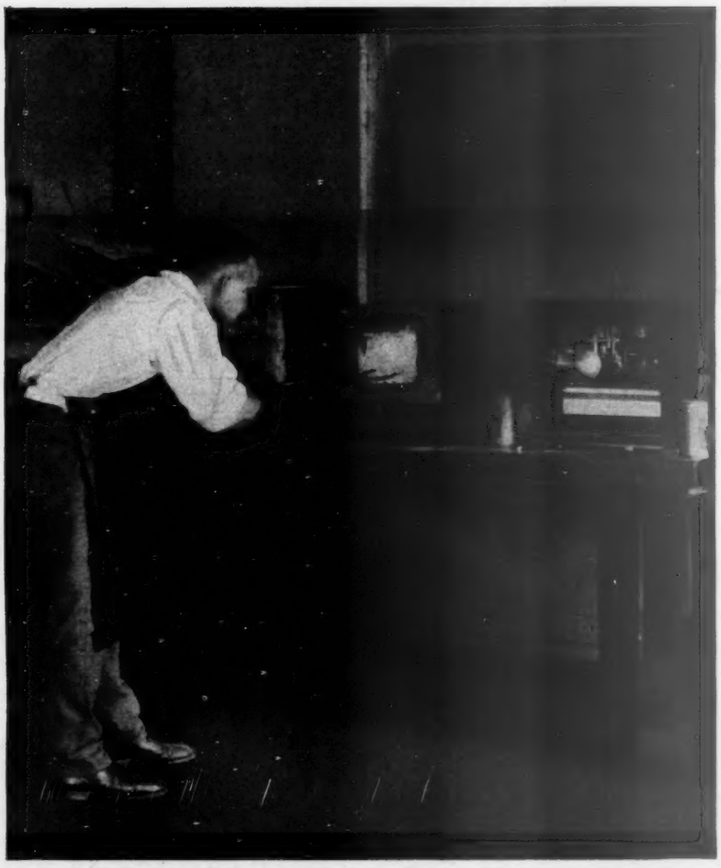

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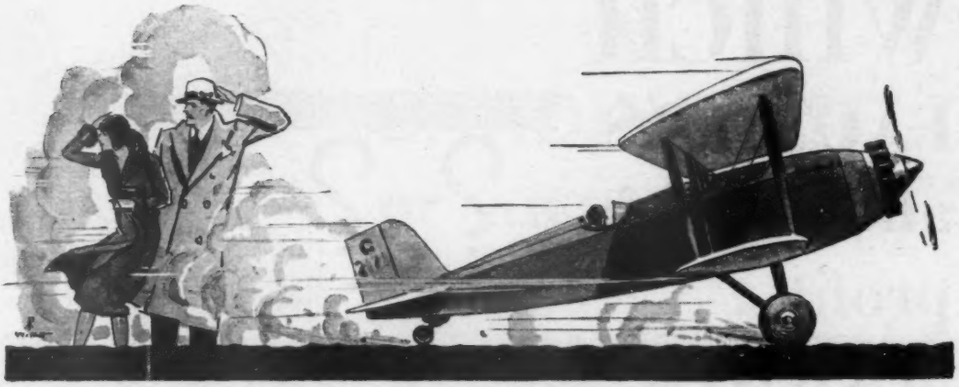

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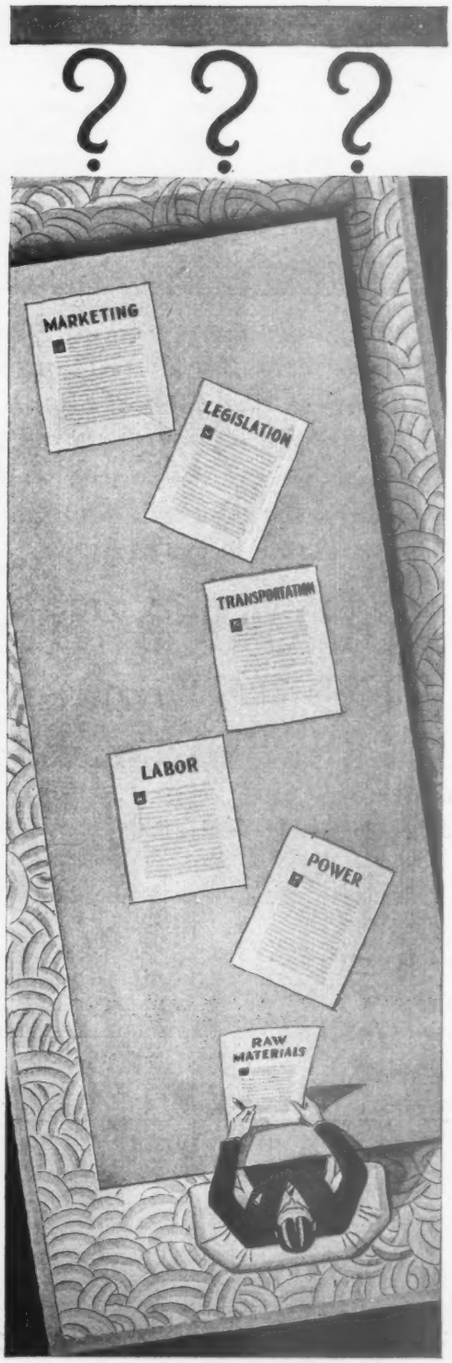

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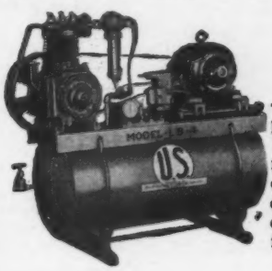

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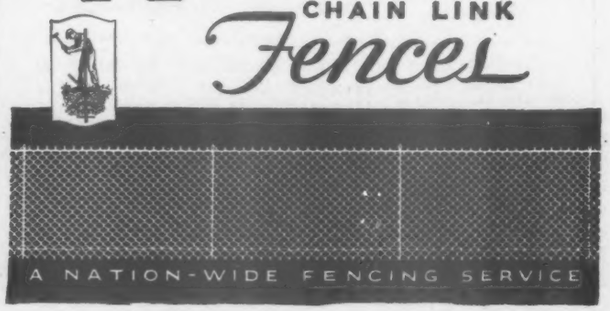

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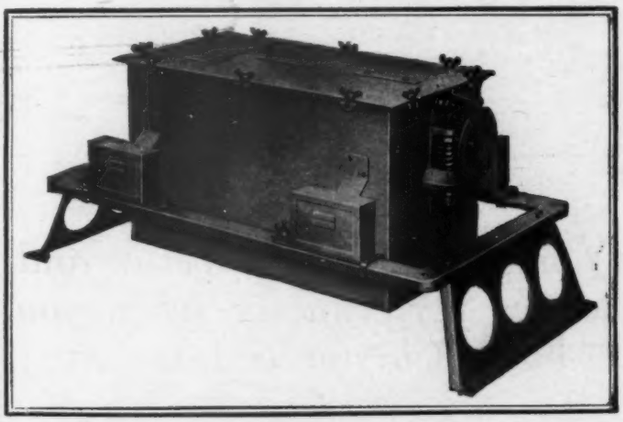

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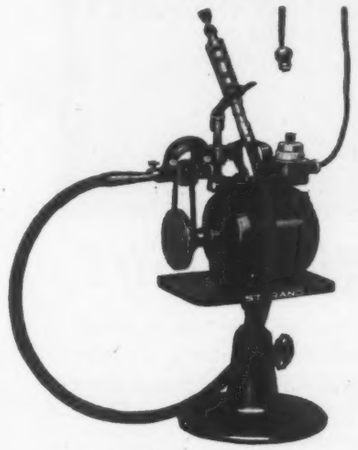

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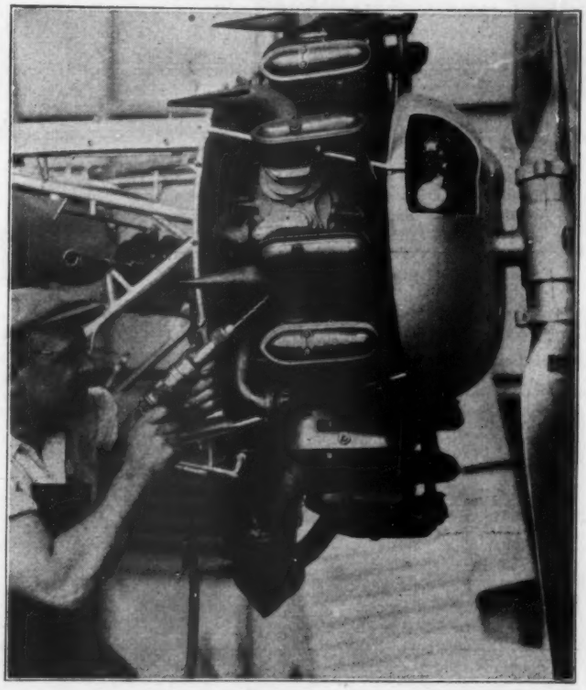

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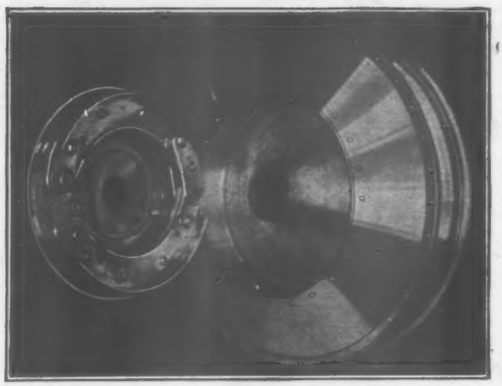

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See full page advertisement in current issues of Aero Digest, Western Flying and Aviation Engineering.

U. S. Hammered Piston Ring Co., Paterson, N. J.

G&O

Radiators and Oil Coolers for Aircraft

EFFICIENT
LIGHT WEIGHT
DEPENDABLE

The G&O Mfg. Co., New Haven, Conn.

THE S. S. P.
BABY ACE

"A BABY IN SIZE . . . AN ACE IN PERFORMANCE"

Write or wire for specifications today. Valuable dealer territory open to those able to qualify.

FLYAWAY $1895 *PRICE SUBJECT TO CHANGE*

ACE AIRCRAFT MANUFACTURING CORPORATION
1016 South Santa Fe, WICHITA, KANSAS

Warm and Comfortable High in a Cold Winter Sky

There's cold flying straight ahead. Now's the time to secure dependable warmth and comfort in your flying togs. SNAPPY SNUG flying clothes and helmets—finest quality and workmanship—the preference on many of the renowned distance and altitude flights—are used by more army and navy pilots than any other brand.

Write for Catalogue C

SNAPPY-SNUG FLYING CLOTHES

CANVAS LEATHER SPECIALTY CO.
South Broad and Dye Sts., Trenton, N. J.

Finishing *FOKKER* wing parts

LIKE FOKKER, the entire aviation industry appreciates the economies in using Porter-Cable-Syracuse Sanders—due chiefly to the speed, accuracy and wide variety of work their construction permits. Type D-2 15 in. Disc Sanders are portable and motor driven, they're profitable in wood, machine and tool-rooms—on flat or curved work.

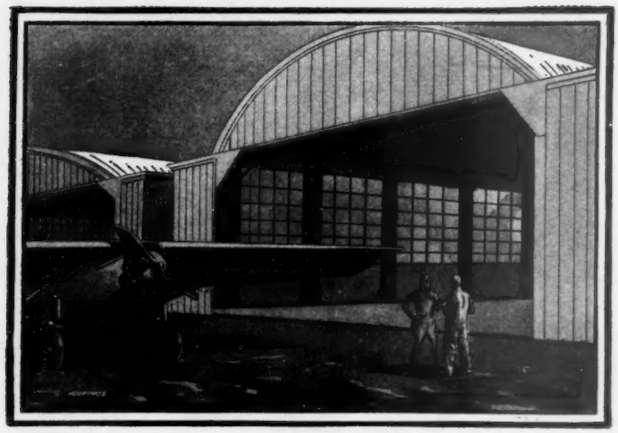
The TAKE-ABOUT, portable belt sander, is saving from 50% to 75% in finishing fuselage and wing units for many plane builders. Eliminates hand sanding and is 5 times faster.

Let us send you details showing why Fokker, Lockheed, Curtiss, Bellanca, Fairchild and Keystone use Syracuse Sanders and Grinders, TAKE-ABOUT Sanders, or both. Write!

The Porter-Cable Machine Co.
Lodi & Wolf Sts., Syracuse, N. Y.

PORTER-CABLE SANDERS

3936A



STEEL HANGARS

• PERMANENT •
• FIRE-PROOF •
• LOW COST •

The broad and practical experience of this organization gained over a period of years in the construction and erection of steel buildings has been applied with equal success to the building of airplane hangars. Our knowledge and experience in building steel hangars is at your disposal.

The Thomas & Armstrong Company
Airplane Hangar Division
Dept. G-3
LONDON, OHIO

THESE FAMOUS FLYERS ALL WEAR AND STAND BACK OF

Gordon AEROTOGS

Lieut. Leonard S. Flo has so much faith in Aerotogs that he wore them on his non-stop flight from Canada to Key West, Fla.

Mr. W. A. Mara, Sec. of the Stinson Aircraft Corp., says that Aerotogs are remarkable for their service and comfort.

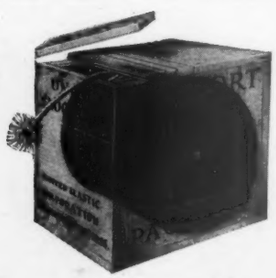
Commander R. E. Byrd and his flying crew are now wearing Aerotogs at the South Pole.

C. W. (Speed) Holman has made aviation history. On long distance flights and consecutive looping tests he wears Aerotogs.

Miss Gene La Vock is a daring stunt flyer. She recommends Aerotogs to all persons associated actively in the art of aviation

Regardless of the conditions under which you fly, there are Gordon Aerotogs to suit your needs. The Aerotogs line is complete from helmet to boots. If your dealer cannot supply you, write to us today. **Gordon & Ferguson, Inc., St. Paul, Minn.**

SHOCK CORD



in handy airport package

A QUALITY product made by the largest manufacturer of elastic fabrics.

UNITED ELASTIC CORPORATION, Easthampton, Mass.

The Budd Wheel Company

Makers of Wheels for airplanes

PHILADELPHIA AND DETROIT

TITANINE

Registered Trade Mark

A Complete Range of
AIRPLANE FINISHING MATERIALS

Dope-proof paint, black, white, aluminum or grey;
Clear nitrate and acetate dopes;
Ti-Two colored one-material dope;
Pigmented nitrate dopes;
Flexible wing lacquer;
Wood and metal lacquer (for inside and outside finish)

TITANINE, Inc.
Union, Union County, New Jersey
Contractors to the United States Government

MACHINES and TOOLS for FACILITATING SHEET METAL OPERATIONS in AIR CRAFT CONSTRUCTION

Catalogue No. 25-A free for the asking

THE PECK, STOW & WILCOX CO., Southington, Conn.

BUFFUM AREOMOTIVE HEATING SYSTEMS

The Buffum Areomotive Heating Systems eliminate forever your cold starting problems, save your valuable time in warming up motor due to improper lubrication created by cold oil and condensation of moisture on cylinder walls.

These systems are complete in every respect and maintain an immediate starting temperature in both cooling medium and crankcase oil which is radiated to entire motor.

Installation is extremely simple and quick. One unit screws into drain plug hole in lower crankcase and the other is attached to lower hose connection. Metallic protected cable is provided for connecting these units with attractive flush plug in side of fuselage installed for plugging in extension cord supplied, to ordinary light socket.

These systems are very economical in operation and cost only a few cents per day to operate and are thus designed to permit continuous connection when plane is not in use. Simply plug in motor when returning plane to hangar and it is always ready for starting at a moment's notice in the coldest weather.

OX5 Model Complete $10.00,
other areomotive systems and automotive systems will be quoted on request.

FRANK G. BUFFUM MFG. CO.
Louisiana, Missouri

STAR PATHFINDER COMPASS

Guiding the World's Aviators Since 1909

NO PILOT ever rode higher than his favor for the **Star Pathfinder Compass.**

For twenty years, in war and in peace, in fighting and in commercial flying, the Star Compass has ranked ace-high with the gentlemen of the air. They know the importance of a trustworthy compass after the take-off—and *they* prefer the accurate guidance of the Star.

Complete information awaits your request — write and let us tell you why the **Star Pathfinder** is so many times chosen as companion to some of the greatest names of the air.

SPECIFICATIONS

Vertical dial, spherical cover lens, built-in compensating unit, flush type mounting with removable cover plate, indirect lighting. 4½-in. high, 3½-in. deep, 5½-in. wide. Compact—rugged—vibration-proof.

STAR COMPASS COMPANY
EAST MILTON, MASSACHUSETTS
Distributors
Consolidated Instrument Co. of America, 365 East 47th Street, New York City
SOLD BY ALL AERONAUTICAL DEALERS

COLONIAL GRAIN UPHOLSTERY LEATHER

made by

EAGLE-OTTAWA LEATHER COMPANY
Grand Haven, Mich.

Genuine leather for airplanes is NON-INFLAMMABLE durable and clean.

Sample books furnished on application

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912 W. Washington Blvd.

St. Louis, Mo.
1600 Locust St.

Toronto, Ont.
152 Duchess St.

New York City
74 Gold St.

San Francisco, Calif.
569 Howard St.

Portland, Ore.
474 Glison St.

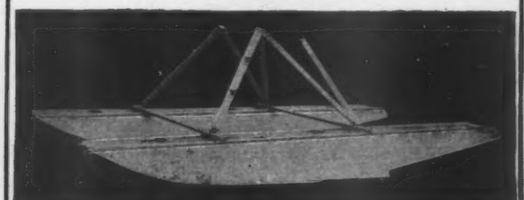
BURGESS DRY CELL BATTERIES

Have Stood the Test under all kinds of conditions for Aircraft, Radio, Ignition, Flashlight and low voltage lighting

BURGESS BATTERY COMPANY
General Sales Office: Chicago

EDO

THE FLOAT MAKERS



EDO converts land planes into seaplanes by furnishing complete float installation, which is interchangeable with the wheel landing gear. Its installations are approved by the Department of Commerce. Complete seaplanes incorporating EDO equipment can also be purchased direct from the leading airplane manufacturers. May we send particulars?

EDO AIRCRAFT CORP., 600 Second St., College Point, L. I.

SEAMLESS STEEL TUBING

All Aircraft Grades

WAREHOUSE STOCKS for immediate shipment in any quantity.

MILL SHIPMENTS for substantial production requirements.

SERVICE STEEL COMPANY

19 Scott St.
BUFFALO

1435 Franklin St.
DETROIT

32 E. Front St.
CINCINNATI

216 N. Alameda St.
LOS ANGELES

23

Makes of Planes Now Standard Equipped With

AEROL LANDING STRUTS

Every fourth issue of Aviation (as well as every issue of three leading monthlies) carries full page advertisements featuring individual planes in this group. Watch these advertisements.

THE CLEVELAND PNEUMATIC TOOL CO.
Cleveland, Ohio

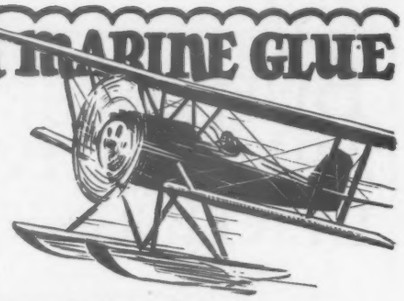
AVIATION MARINE GLUE

On Pontoons

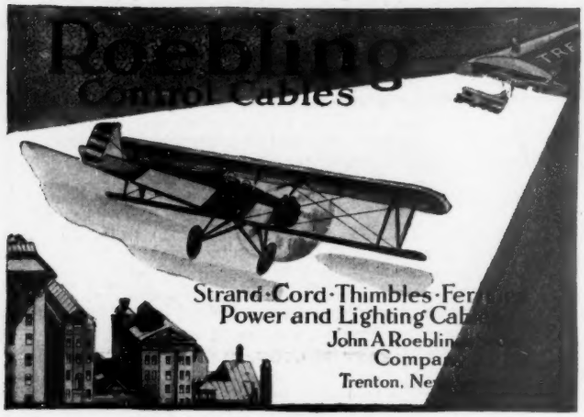
Where resiliency is a necessity

use

Ferdico Aviation
Liquid Marine Glue



L.W. Ferdinand & Co.
152 Kneeland Street, Boston, Mass.



Cunningham-Hall Airplanes

All-metal structure — insures durability, lower maintenance and greater safety.

Manufactured by
CUNNINGHAM-HALL AIRCRAFT CORPORATION
13 Canal St.
ROCHESTER, NEW YORK

PLYWOOD
FOR
AERONAUTICAL CONSTRUCTION

New Jersey Veneer Co.
Paterson, N. J., U. S. A.

When you want **Men**

put your advertising for them on the same basis as other publicity.

If you want competent and efficient assistants, experienced in the field served by this journal, you will naturally find such men among our readers—which include the keenest and most progressive men in the industry.

Get in touch with a number of these men and select the one that is best suited for your needs.

SEARCHLIGHT SECTION

"SEARCHLIGHT" is the *"OPPORTUNITY"* advertising of this industry.

0095

ALL AERONAUTICAL SUPPLIES
UNIVERSAL
AVIATION CORPORATION
ROBERTSON DIVISION
LAMBERT-ST. LOUIS AIRPORT, ANGLUM, MISSOURI

HEAT INDICATORS PRESSURE GAUGES

You can rely on

the accuracy and dependability of every MotoMeter Gauge & Equipment Corporation instrument.

Experience—production facilities—and service are back of every Heat Indicator, Oil Pressure Gauge and Air Pressure Gauge we make.

Model C, Heat Indicator

Model 3015 — A New Army - Navy Size, Heat Indicator

Fuel Pressure Gauge No. 2894A — new Army-Navy size.

Oil Pressure Gauge No. 2893A — new Army-Navy size.

MOTOMETER

MOTO METER

GAUGE & EQUIPMENT CORPORATION
2 Wilbur Avenue, Long Island City, N. Y.

EVERY airport owner or manager should have a copy of our new booklet, *Tycos Meteorological Instruments* for *Airports.* Illustrated throughout and listing instruments which meet government requirements. Write for your copy today.

Taylor Instrument Companies
ROCHESTER, N. Y., U. S. A.
Canadian Plant, Tycos Building, Toronto

Heat Treated Forgings

Greatest strength with least weight

We are pioneers in the production of highest grade aircraft and automotive forgings, and we now have one of the most up-to-date heat-treating plants in the country.

Consult us on your requirements. We will gladly place our experience and resources at your disposal.

The Endicott Forging & Mfg. Co., Inc.
90 North Street, Endicott, N. Y.

ENDICOTT

"The forging people who satisfy"

CLEVELAND
PONTIAC KALAMAZOO

Strategically located links in the TAC *Service Chain*

TAC

Efficient TAC overhaul facilities are easily accessible to transient flyers in Ohio and Michigan. Hangars in Cleveland, Pontiac and Kalamazoo are on traveled airways, within easy flying distance of points in these and neighboring states. Modern service . . . veteran mechanics . . . tested equipment. Rebuilt motors run in and block tested. Service on all motors . . . official Wright service. Replacements, gas and tires. Pioneer instruments.

Thompson Aeronautical Corp.
CLEVELAND, OHIO
Ohio and Michigan Distributors for Stinson, Gypsy Moth, Keystone-Loening Amphibian, Patrician and Pitcairn Sport Mailwing, Bendix Products, Rusco Aero Products and Berryloid Finishes.

PROPELLERS
HARTZELL
PROPELLER FANS
PIQUA, OHIO, U.S.A.

20 Years Experience Behind Our Service
HARTZELL PROPELLER CO. PIQUA, O.

FAIRCHILD cabin monoplanes and open biplanes form a complete line of quality aircraft for dealers' sales. Fairchild aviation products also include pontoons, skis, landing lights and engines. Dealers address Fairchild Airplane Manufacturing Corporation, Farmingdale, L. I., U. S. A.

AIRPLANES

For Winter Flying

Depend upon Pennzoil for safe lubrication and protection. Don't be satisfied with a lesser quality than "the best motor oil in the world."

THE PENNZOIL COMPANY, Oil City, Pa.

PENNZOIL

HIGHEST QUALITY 100% SUPREME PENNSYLVANIA OIL

WRISTAG WATCH BAND NO. 101 . . . $6.00

A Wonderful Christmas Gift

WATCH Band easily attached to wrist watch. Folding buckle allows to slip over hand. Armored mesh non-tarnishable white metal band. Tags of Sterling Silver with yellow gold filled wings or silver wings. Space on shield for engraving T.P., L.P., or L.M., License Number or name of school or Company. Name and address may be engraved either on front or back of tag.

De Luxe Model Wristag (below), heavy Sterling Silver, with an easily adjusted fine mesh strap, non-tarnishable white metal. Space for engraving same as on Watch Band.

PARKER & COMPANY
SOLE MANUFACTURERS
617 ARCADE BLDG., ST. LOUIS, MO.

DE LUXE MODEL WRISTAG . . . $5.00

Airplanes, Flying Boats Motors and Supplies

3 Place Warner Motored Travel Air Biplane, very moderately used, new price $5,850.00, our price $3,500.00; 4 Place Warner Motored Cabanaire Airplane, very moderately used, new price $7,200.00, our price $4,800.00. OX5 Motored 3 Place American Eagle Airplane, moderately used, excellent condition, $1,800.00.

A Dandy Commercial Ace, sheeplined flying suit $60.00; Flight Wonder heavy-napped wool lined snappy snug flying suit $47.00; Lee Winter Flying Suit, heavy wool lined $18.00. Seal Wallaby fur lined highest grade famous Aerotex flying suit, with sunset seat $120.00, or Black Dog Hair lined $110.00. All our suits have fur collars and zipper fasteners and are splendid new merchandise.

Black Leather Jacket, sheeplined with leather collar, extra high grade, $16.00; also available in wool-lined at same price. Sheeplined black leather coat $23.50; or with fur collar, $26.50; black leather breeches, $12.00. Wool-lined black leather coat, $18.00. Finest grade chocolate brown, cape leather helmet, fur lined, $8.00; very high grade leather helmet, fur lined, $6.50; beaverized sheeplined, dandy brown leather helmet, $4.75; black leather sheeplined helmet, $3.90. A warm wool-lined leather helmet for school boys, $1.75.

WYD Face Mask Goggle, covering face only and including non-shatterable goggles, $6.50; DG Triple Chenille padded wide vision non-shatterable goggles, $6.00; Curved lens, wide vision, face mask goggles, $4.50. 3 Buckle sheeplined flying Moccasins, $9.75; Surplus Moccasins, $5.50.

Flightex Gov't specified cotton airplane cloth, .50c. per yard; Two inch scalloped cotton tape, highest grade, .04c. per yard, 100-yard rolls, .03¾c. per yard. Dope, Thread and Needles, Tires, Wheels and everything for Aircraft.

All parts for OX5, OXX6, and many Liberty, Hispano, Clerget, LeRhone and Lawrence parts; all parts for Standard, Canuck and JN4D; all Miller Products for OX5's.

FLOYD J. LOGAN AVIATION CO.
716 W. Superior, Cleveland, Ohio
Send for Sales Bulletin—you will be surprised.

The fact that schools advertising in the WHERE TO FLY section of AVIATION have done so over a period of years is one of the best testimonials to the efficiency of this type of advertising.

AIRCRAFT SERVICE DIRECTORY

HANGARS

All-steel, fireproof. See models at our Jamaica Sea Airport

Let us quote. Send for folder.

ADVANCED AIRCRAFT CORPORATION

135-08 Jerome Ave., Richmond Hill, N. Y.

GARDNER PROPELLERS

In Stock or on Short Notice
12 Years' Experience
GARDNER PROPELLER WORKS
Forest Park, Ill.

TRIUMPH

MAGNETIC
FUEL GAGES FOR AIRCRAFT
NEW MODELS FOR COWL, WING, OR SPECIAL TANKS
Manufactured by
The Boston Auto Gage Company
PITTSFIELD, MASSACHUSETTS

Burgess Norton Perfectlap Piston Pins for the following makes of motors are stocked by Automotive Jobbers everywhere.

Curtiss OX-5
Curtiss OXX-6
Wright Whirlwind J4, J5
U.S.A.Std.
Liberty

THE BURGESS NORTON MFG. CO.,
549 Peyton St., Geneva, Ill.

The Aircraft Service Directory brings you into weekly contact with the entire Aeronautical Industry.

Airplane Covers

Silk thread sewed with "FLIGHTEX" AAA Fabric. Our prices below that of cheap cotton

Standard J1	$105	American Eagle	$100
Jenny	95	Commandaire	100
Canuck	100	Challanger	100
Waco 9	95	Swallow	95
Waco 10	95	Travel Air	100
Eaglerock	100	Monocoupe	75

Pinked Tape 3c. yd. Long Needle, 25c.
Dope $1.50 gal. Thinner, Ditto.
Ribcord $3 lb.
EVERYTHING FOR AIRCRAFT

OSTERGAARD
AIRCRAFT
WORKS
4305 N. Narragansett Ave., Chicago, Ill.

AVIATION PROTECTION, INC.
INSURANCE BROKERS TO AVIATION
110 WILLIAM STREET
NEW YORK

HASKELITE
PLYWOOD

Used by every important builder. Recognized as the standard plywood for airplane construction. Over 30 applications. Blue print data book on request.

HASKELITE MFG. CORPORATION
120 S. LaSalle Street, Chicago, Illinois

Motorize Your Hangar Doors

Allen & Drew, Inc.
Cambridge, Mass.

See our full page Adv. in Nov. 16.

STEARMAN and AEROMARINE KLEMM

GEO. A. WIES, INC.
Hangar and Office
Roosevelt Field
Garden City, New York

PITCH INDICATOR
Adjustable Zero
Readable at a Glance.
Booklet on Request
Frisbie Aircraft Products
Box 389, New Haven, Conn

Paragon Propellers

Paragon Engineers, Inc., 242 Grindal St. Baltimore, Md.

Phoenix Clear Nitrate Dope

$1.35 in 50 gal. wood barrels.
$1.37 in 30 gal. wood barrels.
$1.55 in 5 gal. boxed cans.
Immediate shipments F. O. B. factory. All fresh made from new and high grade materials.
PHOENIX AIRCRAFT PRODUCTS CO.
Williamsville, N. Y.

See our Advertisement
On inside back cover Nov. 16th issue
PIONEER INSTRUMENT COMPANY
254 LEXINGTON AVE. BROOKLYN NEW YORK

PITCH & BANK INDICATOR
Your Position at a glance
Booklet "RIEKER Navigating Instruments" sent on request.
RIEKER INSTRUMENT COMPANY
1919 Fairmount Ave., Philadelphia, Pa.

Actual Size
SEND
ONE DOLLAR

We will send you by return mail a beautiful pair of sterling silver wings mounted on bar pin with safety catch, also identification card issued by National Flyers Ass'n. These pins are being worn by thousands of aviators, aviation mechanics and boosters.

Illustrated booklet describing Davenport's large Airport and school mailed with each order.

Iowa-Illinois Airways Inc.
Davenport, Iowa

STAKLAK REG. U.S. PAT. OFF. WONT BURN OFF

Developed especially for use on airplane exhaust rings, manifolds and stacks.

Adds greatly to the appearance of any ship. Protects the surface from scale and rust.

Can be furnished in three colors, Red, Blue or Green half-pint cans 50c or Aluminum half-pint cans 75c.

Manufactured exclusively for and sold by

JOHN S. COX & SON
Aeronautical Supplies
Terre Haute, Ind.

ROBERT J. STEWART
Aircraft Supplies
Challenger Airplanes
OX Cylinders Reconditioned
Send for Catalog F
Catonsville Maryland

AIRPLANE SPRUCE

Rough Green-Kiln Dried Rough-Air Dried or Finished to your sizes. Prompt shipments in carloads and less than carloads. We supply many of the largest manufacturers in the United States and Europe.

Specialists in Airplane Spruce for Fifteen Years
J. V. G. POSEY & COMPANY
Public Service Building, PORTLAND, ORE.

SEAMLESS STEEL TUBING

Made to Aircraft Specifications 10225-D
Warehouse stock also mill shipment.

The Cleveland Tool & Supply Company
1427-1437 West Sixth St. Cleveland, O.

WHERE TO FLY

ALABAMA

Our Sunshine and Warm Weather Makes Student Training Pleasant.

MONTGOMERY SCHOOL OF AERONAUTICS
Montgomery, Alabama
Illustrated catalogue on request.

CALIFORNIA

AIRTECH SCHOOL OF AVIATION
LINDBERGH FIELD, SAN DIEGO, CALIFORNIA
Send For Complete Information
Department of Commerce Approved Transport Ground & Flying School

CONNECTICUT

L & H
FLYING SCHOOL
Hartford Airport—at Hartford, Conn.
PART OF THE
COLONIAL
FLYING SYSTEM

FLORIDA

The Insignia of Specialists

Choose your school as you would your doctor.

Courses offered that qualify you for Dept. of Commerce License. Write for details.

McMULLEN AVIATION COLLEGE
Tampa, Fla., P.O. Box 4191
Where *every* day is a FLYING day

NEPCO—School of Flying

Announces the opening of their Winter Flying School at Piper Fuller Airport, St. Petersburg, Florida, December 1st.
Entire flying equipment and personnel will be moved from its own mile square airport, Wisconsin Rapids, Wis., to the Sunshine City. Planes used for instruction include Fairchild-KR. Biplanes, Curtiss Robin Monoplanes, Fairchild 5-passenger Monoplanes and 12 passenger Ford Tri-Motor Monoplanes. Room and Board at airport. Enrollments being received now and limited to 50 students.
25 Hr. Private Pilot's Course, $475. 50 Hr. Limited Commercial Pilot's Course, $850. 200 Hr. Transport Pilot's Course, $3,500. Terms can be arranged. All planes and Pilots Licensed by U. S. Government. For full information write, wire or call.
NEPCO TRI-CITY Flying Service, Inc.
Capt. L. G. Mulzer, Gen. Mgr.
Wisconsin Rapids, Wis.

ILLINOIS

Eagle Airways, Hinckley, Illinois, formerly Eagle Airport School of Aviation, 60 miles West of Chicago. Learn to fly at our new location on the Transcontinental Airway, DeKalb County Airport, equipped for night flying. Transport Pilots, modern equipment, reasonable rates, excellent accomodations. Distributors for Stinson Monoplanes, Air-Kings and Monocoupes. Write for free information.
EAGLE AIRWAYS, INC.
Hinckley, Illinois

ILLINOIS

FOR SUCCESS IN THE AIR TAKE OFF WITH

CONTINENTAL

Investigate our Pilots Training School—Unit Method—pay as you go. Air Corps System — no long ground course—our own field to fly from.

CONTINENTAL AIR SERVICES
Incorporated
2420 South Parkway, Chicago

Learn to Fly at a Midwest Airways Corporation School
Under the direction of John H. Livingston
Three large Airports in the central west—at Aurora, Ill., Monmouth, Ill., and Waterloo, Iowa. We are training students to fly because we need pilots for the planes we sell. Largest distributors of commercial aircraft in the central states.
MIDWEST AIRWAYS CORPORATION
Waco and Ryan Distributors

MICHIGAN

ALL NEW, HIGH PERFORMANCE EQUIPMENT. COMPLETE GROUND AND FLIGHT TRAINING FOR GOVERNMENT PILOT LICENSES.

Write

NATIONAL AIRWAYS, INC.
533 Book Bldg., Detroit

For the Protection of Our Readers

and to give this advertising section the maximum practical value, the right is reserved to reject, revise, or properly classify all "Fly" advertisements.

MISSOURI

N-693

A National System of Aviation Schools

Universal Flying School	Cleveland, Ohio
Universal Flying School	Marion, Ill.
Universal Flying School	Memphis, Tenn.
Universal Flying School	Minneapolis, Minn.
Universal Flying School	Oklahoma City, Okla.
Universal Flying School	Rochester, Minn.
Universal Flying School	St. Louis, Mo.
Universal Flying School	St. Paul, Minn.
Universal Flying School	Wichita, Kansas
Porterfield Flying School	Kansas City, Kansas

UNIVERSAL AVIATION SCHOOL
Headquarters
1061-1070 Boatmen's Bank Bldg., St. Louis, Mo.

NEBRASKA

LearnAVIATION
WHERE LINDBERGH STARTED!

GET TRAINING THAT ASSURES SUCCESS!

Come to Lincoln—one of the largest, best-known and finest-equipped civilian air schools in the U. S. We trained Lindbergh (our FREE Literature tells the story). Prepare you for a pilot, commercial or transport license. Complete, practical courses in airplane building and mechanics. Instructors and training planes carry U. S. Dept. of Commerce licenses. Write for FREE Literature today.

LINCOLN AIRPLANE SCHOOL
740 Aircraft Bldg., Lincoln, Nebr.

NEW JERSEY

GET A FLYING START AT
AIRVIEW FLYING SERVICE, Inc.

Learn to fly at finest Airport on Jersey Coast

Distributors for	*Agents for*
Waco	Fairchild
Aeromarine-Klemm	Curtiss Products

Taxi Service — Photography — Service and Repairs — Hangar Space — 1 hour from New York City.

Write for details.

Phone Red Bank 1730
Red Bank, N. J.

FOR INFORMATION REGARDING FLYING SCHOOLS

LOOK IN THE 'WHERE TO FLY' SECTION OF 'AVIATION'

YOU CAN ASCERTAIN AT A GLANCE THE BEST SCHOOLS THROUGHOUT THE COUNTRY

Information also obtainable from
SEARCHLIGHT DEPARTMENT, Tenth Ave. at 36th St., New York

Av-06

WHERE TO FLY

NEW YORK STATE

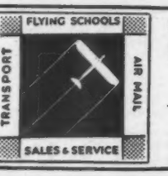
THE PERFECT TAKE-OFF FOR YOUR FLYING CAREER...

ROOSEVELT AVIATION SCHOOL

After the Army pattern—equipment, curriculum, Army-trained instructors. At Roosevelt Field, where Lindbergh, Chamberlin and Byrd hopped from. 45 minutes from Broadway. Dormitory, for resident students, and swimming pool now in progress. *Write* N. J. Boots, Lt. Col., Roosevelt Aviation School, Inc., Mineola, L.I., N.Y.

COLONIAL FLYING SCHOOL
Utica Airport—at Utica, N. Y.
PART OF THE **COLONIAL** FLYING SYSTEM

ROCHESTER FLYING SCHOOL
Rochester Airport—at Rochester, N. Y.
PART OF THE **COLONIAL** FLYING SYSTEM



COLONIAL FLYING SCHOOL
Buffalo Airport—at Buffalo, N. Y.
PART OF THE **COLONIAL** FLYING SYSTEM

NEW YORK CITY

CURTISS-WRIGHT FLYING SCHOOLS
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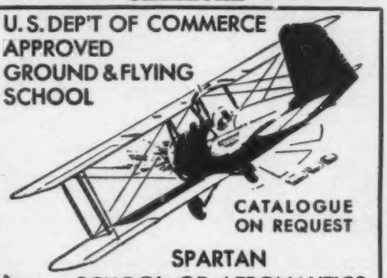

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THE NEW B/J--The First Full Vision Plane

NOW—an enclosed plane without a blind spot. The B/J engineering staff, drawn together for the pioneering of new designs for military planes, has carried this same original designing into a two-place tandem monoplane for commercial, private or training use.

The result is that the first commercial B/J embodies a new wing arrangement that affords full vision in all directions.

Seated at the controls of the new B/J, the pilot commands a full, clear view . . . overhead . . . above and below the wing on either side . . . and to the rear. By a movement of the eye or turn of the head he views the entire cyclorama of land and sky.

The ample side windows, of shatterproof glass, may be opened or closed at will.

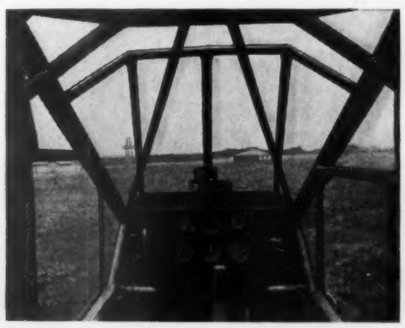
Combined with this unique full vision design are remarkable stability, easy yet positive controls, and numerous other features which make the B/J especially suited for student training or private flying.

The advanced design of control surfaces and gear afford a degree of manoeuverability and control comparable to that of military aircraft. High cruising speed, ample fuel capacity and relatively small fuel consumption result in a wide cruising range. A high angle of climb, slow landing speed and wheel brakes make the plane well adapted for small field operations and for private use.

Setting new standards in ease of handling and in safe, comfortable, care-free flying, the B/J is a "Pacemaker of the Air" in salability as well as in performance. Write for further information about this new B/J, and about distributor territories still open.

A view inside the comfortable, roomy cabin of the new B/J, showing the all-window construction which begins at a level with the pilot's waist and extends above the wing, back beyond the rear seat and across the top.

The pilot of the new B/J has only to move his eyes or turn his head to command a full, clear view in all directions—overhead, above or below the wing on either side, or to the rear.



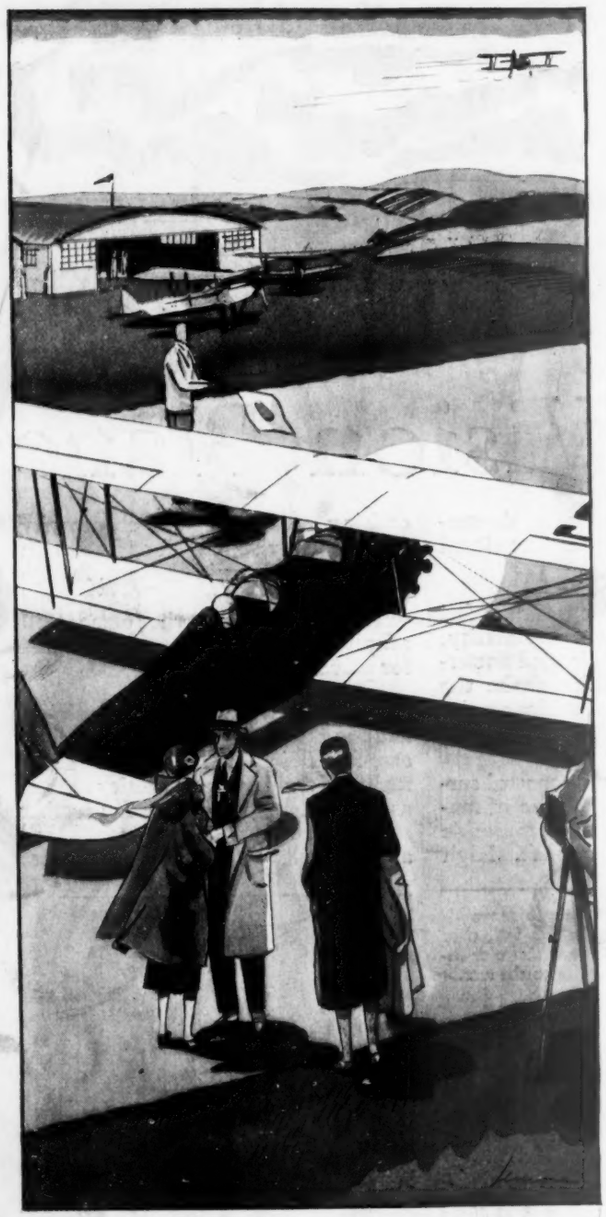
Taking off or landing, a broad, clear view of both land and sky spreads before the pilot of the new B/J. Equipment includes clock, compass, tachometer, air speed indicator, altimeter, oil pressure, temperature and gasoline gauges.

BERLINER JOYCE AIRCRAFT CORP.

BALTIMORE MARYLAND

"PACEMAKERS OF THE AIR"

NEW TRAFFIC LEAPS ALOFT AS COSTS COME DOWN!



FLYING, today, is a commonplace to thousands—a quicker, cleaner, healthier way of getting from here to there. And this increase is due to cuts in operating cost and the knowing use of good equipment.

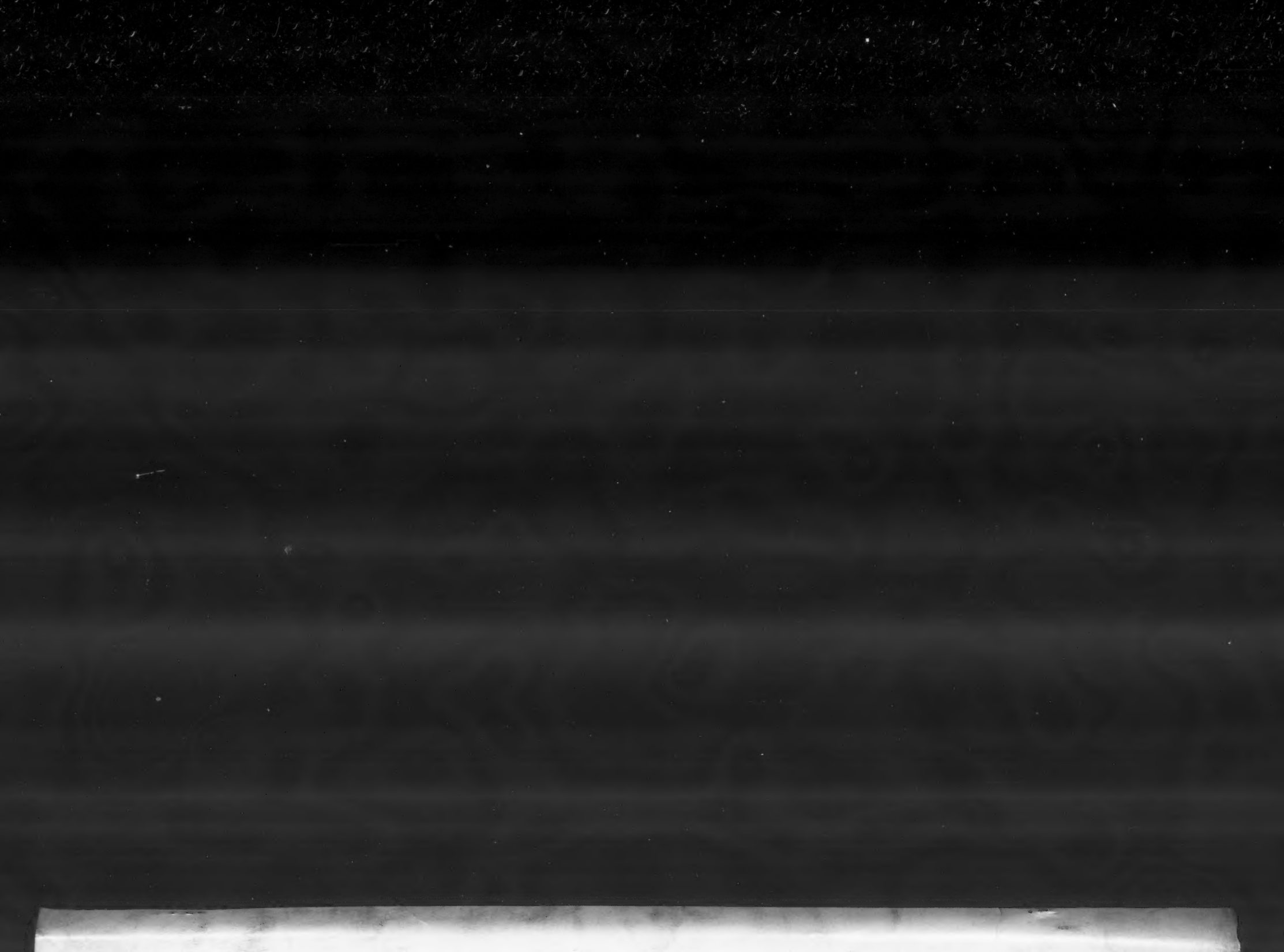
The National Air Tour—for the trophy offered by Mr. Edsel Ford—gathered multitudes at every Airport and awoke them to the fact that airplanes operate steadily and economically—in good weather and bad just as the calendar gives it. Each plane covered more than 5,000 miles in 16 days . . . on schedule time.

"Whirlwinds" powered over half the planes on Tour this year. They won 1st, 2nd, and 3rd—70 per cent of all awards in fact! Yet this showing, under gruelling service conditions, is no more than an example of what thousands of "Whirlwinds" are doing . . . everywhere . . . every day!

To all men who use the air, Wright can say that with the new "Whirlwinds," costs are coming down. The "high cost" bogey of flying is fading from the picture. To those who have not yet flown Wright urges that, with a licensed pilot and a licensed plane, they join the "First Flight Club" in confidence and comfort, behind a "Whirlwind" engine.

WRIGHT

AERONAUTICAL CORPORATION

PATERSON, NEW JERSEY

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